(%i1)

```
/* define special summation function */
f(i,j) := sum(R[i,j,sigma,0]*gContr[i,sigma]*gContr[j,0],sigma,0,3)
        + sum(R[i,j,sigma,1]*gContr[i,sigma]*gContr[j,1],sigma,0,3)
        + sum(R[i,j,sigma,2]*gContr[i,sigma]*gContr[j,2],sigma,0,3)
        + sum(R[i,j,sigma,3]*gContr[i,sigma]*gContr[j,3],sigma,0,3);
```

(%o1) $f(i,j) := sum(R_{i,j,\sigma,0}\, gContr_{i,\sigma}\, gContr_{j,0},\sigma,0,3) +$

$sum(R_{i,j,\sigma,1}\, gContr_{i,\sigma}\, gContr_{j,1},\sigma,0,3) +$

$sum(R_{i,j,\sigma,2}\, gContr_{i,\sigma}\, gContr_{j,2},\sigma,0,3) +$

$sum(R_{i,j,\sigma,3}\, gContr_{i,\sigma}\, gContr_{j,3},\sigma,0,3)$

(%i2)
```
/* define coordinate vector */
array(x, 3);
[x[0],x[1],x[2],x[3]]: [t, x1, x2, x3];
```

(%o2) x

(%o3) $[\, t\, ,\, x1\, ,\, x2\, ,\, x3\,]$

(%i4)
```
/* function dependencies */
depends([vs],[xs],[xs],[t],[f],[rs],[rs],[t,x1,x2,x3]);
```

(%o4) $[\, vs(xs)\, ,\, xs(t)\, ,\, f(rs)\, ,\, rs(t,x1,x2,x3)]$

(%i5)
```
/* dependency check */
diff(f,t);
```

(%o5) $\left(\dfrac{d}{d\,rs}\,f\right)\left(\dfrac{d}{d\,t}\,rs\right)$

(%i6)
```
vs: diff(xs,t);
rs: ((x1-xs)^2 + x2^2 + x3^2)^(1/2);
```

(%o6) $\dfrac{d}{d\,t}\,xs$

(%o7) $\sqrt{\left(x1 - xs\right)^2 + x3^2 + x2^2}$

(%i8)
```
/* g1 is symm. metric with indices 1...4 */
g1: matrix(
  [(vs^2*f^2-1),-2*vs*f,0,0],
  [-2*vs*f,1,0,0],
  [0,0,1,0],
  [0,0,0,1]
  );
```

$$(\%o8)\quad \begin{bmatrix} f^2\left(\dfrac{d}{dt}xs\right)^2 - 1 & -2f\left(\dfrac{d}{dt}xs\right) & 0 & 0 \\[2em] -2f\left(\dfrac{d}{dt}xs\right) & 1 & 0 & 0 \\[2em] 0 & 0 & 1 & 0 \\[1em] 0 & 0 & 0 & 1 \end{bmatrix}$$

(%i9)   /* contravariant g is inverse of g */
        gContr1: ratsimp(invert(g1));

$$(\%o9)\quad \begin{bmatrix} -\dfrac{1}{3f^2\left(\dfrac{d}{dt}xs\right)^2 + 1} & -\dfrac{2f\left(\dfrac{d}{dt}xs\right)}{3f^2\left(\dfrac{d}{dt}xs\right)^2 + 1} & 0 & 0 \\[3em] -\dfrac{2f\left(\dfrac{d}{dt}xs\right)}{3f^2\left(\dfrac{d}{dt}xs\right)^2 + 1} & -\dfrac{f^2\left(\dfrac{d}{dt}xs\right)^2 - 1}{3f^2\left(\dfrac{d}{dt}xs\right)^2 + 1} & 0 & 0 \\[3em] 0 & 0 & 1 & 0 \\[1em] 0 & 0 & 0 & 1 \end{bmatrix}$$

(%i10)

```
/* g1 and gContr1 are transformed to g and gContr (indices 0...3) */
for mu:0 thru 3 do {
for nu:0 thru 3 do {
    g     [mu,nu]: g1      [mu+1, nu+1],
    gContr[mu,nu]: gContr1[mu+1, nu+1]
}}$
```

(%i11) /* computation of Christoffel symbols Gamma^sigma_mu_nu */
```
        for sigma:0 thru 3 do {
        for mu:0 thru 3 do {
        for nu:0 thru 3 do {
            Gamma[sigma,mu,nu] :
            /* rho sum by function call: */
            sum(
                1/2 * gContr[sigma,rho]*(
                diff(g[nu,rho],x[mu] ) +
                diff(g[rho,mu],x[nu] ) -
                diff(g[mu,nu] ,x[rho])),
            rho, 0, 3),
            /* evaluate differentiation dy/dr */
            Gamma[sigma,mu,nu]: ev(Gamma[sigma,mu,nu],diff)
        }}}$
```

```
(%i12)  /* dislplay Gamma's being different from zero */
        for i:0 thru 3 do {
        for j:0 thru 3 do {
        for k:0 thru 3 do {
            if Gamma[i,j,k] # 0 then {
                display(Gamma[i,j,k])
            }}}}$
```

$$\Gamma_{0,0,0} = -\frac{2f^2\left(\frac{d}{dt}xs\right)\left(\frac{d^2}{dt^2}xs\right) + 2f\left(\frac{d}{drs}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dt}xs\right)^2}{2\left(3f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)} -$$

$$\frac{f\left(\frac{d}{dt}xs\right)\left(-4f\left(\frac{d^2}{dt^2}xs\right) - 2f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^2 - 4\left(\frac{d}{drs}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dt}xs\right)\right)}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,0,1} = -\frac{f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^2}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,0,2} = \frac{f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,0,3} = \frac{f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,1,0} = -\frac{f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^2}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,1,1} = \frac{2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,1,2} = \frac{\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,1,3} = \frac{\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)}{3f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$\Gamma_{0,2,0} = \frac{f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{0,2,1} = \frac{\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{0,3,0} = \frac{f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{0,3,1} = \frac{\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{1,0,0} = -\frac{f\left(\frac{d}{d\,t}xs\right)\left(2\,f^2\left(\frac{d}{d\,t}xs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,t}xs\right)^2\right)}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1} -$$

$$\frac{\left(f^2\left(\frac{d}{d\,t}xs\right)^2 - 1\right)\left(-4\,f\left(\frac{d^2}{d\,t^2}xs\right) - 2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 4\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,t}xs\right)\right)}{2\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)}$$

$$\Gamma_{1,0,1} = -\frac{2\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{1,0,2} = \frac{\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\left(f^2\left(\frac{d}{d\,t}xs\right)^2 - 1\right)}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1} - \frac{2\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{1,0,3} = \frac{\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\left(f^2\left(\frac{d}{d\,t}xs\right)^2 - 1\right)}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1} - \frac{2\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{1,1,0} = -\frac{2\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3}{3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$\Gamma_{1,1,1} = \frac{4 f \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x1} rs\right)\left(\frac{d}{d\,t} xs\right)^2}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1}$$

$$\Gamma_{1,1,2} = \frac{2 f \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x2} rs\right)\left(\frac{d}{d\,t} xs\right)^2}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1}$$

$$\Gamma_{1,1,3} = \frac{2 f \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x3} rs\right)\left(\frac{d}{d\,t} xs\right)^2}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1}$$

$$\Gamma_{1,2,0} = \frac{\left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x2} rs\right)\left(\frac{d}{d\,t} xs\right)\left(f^2\left(\frac{d}{d\,t} xs\right)^2 - 1\right)}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1} - \frac{2 f^2 \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x2} rs\right)\left(\frac{d}{d\,t} xs\right)^3}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1}$$

$$\Gamma_{1,2,1} = \frac{2 f \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x2} rs\right)\left(\frac{d}{d\,t} xs\right)^2}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1}$$

$$\Gamma_{1,3,0} = \frac{\left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x3} rs\right)\left(\frac{d}{d\,t} xs\right)\left(f^2\left(\frac{d}{d\,t} xs\right)^2 - 1\right)}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1} - \frac{2 f^2 \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x3} rs\right)\left(\frac{d}{d\,t} xs\right)^3}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1}$$

$$\Gamma_{1,3,1} = \frac{2 f \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x3} rs\right)\left(\frac{d}{d\,t} xs\right)^2}{3 f^2 \left(\frac{d}{d\,t} xs\right)^2 + 1}$$

$$\Gamma_{2,0,0} = - f \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x2} rs\right)\left(\frac{d}{d\,t} xs\right)^2$$

$$\Gamma_{2,0,1} = \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x2} rs\right)\left(\frac{d}{d\,t} xs\right)$$

$$\Gamma_{2,1,0} = \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x2} rs\right)\left(\frac{d}{d\,t} xs\right)$$

$$\Gamma_{3,0,0} = - f \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x3} rs\right)\left(\frac{d}{d\,t} xs\right)^2$$

$$\Gamma_{3,0,1} = \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x3} rs\right)\left(\frac{d}{d\,t} xs\right)$$

$$\Gamma_{3,1,0} = \left(\frac{d}{d\,rs} f\right)\left(\frac{d}{d\,x3} rs\right)\left(\frac{d}{d\,t} xs\right)$$

```
(%i13)  /* compute Riemann tensor elements */
        for rho:0 thru 3 do {
        for sigma:0 thru 3 do {
        for mu:0 thru 3 do {
        for nu:0 thru 3 do {
            R[rho,sigma,mu,nu] :
            diff(Gamma[rho,nu,sigma],x[mu]) -
            diff(Gamma[rho,mu,sigma],x[nu]) +
            /* lambda sums by function call: */
            sum(
                Gamma[rho,mu,lambda] * Gamma[lambda,nu,sigma] -
                Gamma[rho,nu,lambda] * Gamma[lambda,mu,sigma],
                lambda, 0, 3)
        }}}}$
```

```
(%i14)  /* dislplay R's being different from zero */
        for i:0 thru 3 do {
        for j:0 thru 3 do {
        for k:0 thru 3 do {
        for l:0 thru 3 do {
            R[i,j,k,l] : /*ratsimp*/(factor(R[i,j,k,l])),
            if R[i,j,k,l] # 0 then display(R[i,j,k,l])
        }}}}$
```

$$R_{0,0,0,1} = - \left(2\ f\left(\frac{d}{dt}xs\right) \left(2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 3\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2 \right.\right.$$

$$\left(\frac{d}{dt}xs\right)^4 - 3\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)$$

$$\left.\left.+ 2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right) \right)\right) / \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1 \right)^2$$

$$R_{0,0,0,2} = - \left(2\ f\left(\frac{d}{dt}xs\right) \left(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right) \right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big) \Big/ \left(3f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,0,0,3} = -\Big(2f\left(\frac{d}{dt}xs\right)\Big(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big) \Big/ \left(3f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,0,1,0} = \Big(2f\left(\frac{d}{dt}xs\right)\Big(2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 3f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^4 - 3f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3f^3$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)$$

$$+ 2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big) \Big/ \left(3f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,0,1,2} = \Big(2f\left(\frac{d}{dt}xs\right)^2\Big(3f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3f$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\Big)\Big) \Big/ \left(3f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,0,1,3} = \left(2\, f \left(\frac{d}{dt} xs\right)^2 \left(3\, f^2 \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^2 - 3\, f \right.\right.$$

$$\left.\left(\frac{d}{drs} f\right)^2 \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^2 + 3\, f^2 \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx3} rs\right) \left(\frac{d}{dt} xs\right)^2 + \left(\frac{d^2}{drs^2} f\right)\right.$$

$$\left.\left.\left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx3} rs\right) + \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx3} rs\right) \right) \right) \Bigg/ \left(3\, f^2 \left(\frac{d}{dt} xs\right)^2 + 1 \right)^2$$

$$R_{0,0,2,0} = \left(2\, f \left(\frac{d}{dt} xs\right) \left(\left(\frac{d}{drs} f\right) \left(\frac{d}{dx2} rs\right) \left(\frac{d^2}{dt^2} xs\right) + 3\, f^3 \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dx1} rs\right)\right.\right.$$

$$\left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right)^4 + 3\, f^3 \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx2} rs\right) \left(\frac{d}{dt} xs\right)^4 + 3\, f^2 \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dt} rs\right)$$

$$\left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right)^3 - 3\, f \left(\frac{d}{drs} f\right)^2 \left(\frac{d}{dt} rs\right) \left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right)^3 + 3\, f^2 \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dt\,dx2} rs\right)$$

$$\left(\frac{d}{dt} xs\right)^3 + f \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right)^2 + \left(\frac{d}{drs} f\right)^2 \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right)^2$$

$$+ f \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx2} rs\right) \left(\frac{d}{dt} xs\right)^2 + \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dt} rs\right) \left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right) + \left(\frac{d}{drs} f\right)$$

$$\left.\left.\left(\frac{d^2}{dt\,dx2} rs\right) \left(\frac{d}{dt} xs\right) \right) \right) \Bigg/ \left(3\, f^2 \left(\frac{d}{dt} xs\right)^2 + 1 \right)^2$$

$$R_{0,0,2,1} = - \left(2\, f \left(\frac{d}{dt} xs\right)^2 \left(3\, f^2 \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right)^2 - 3\, f\right.\right.$$

$$\left(\frac{d}{drs} f\right)^2 \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx2} rs\right) \left(\frac{d}{dt} xs\right)^2 + 3\, f^2 \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx2} rs\right) \left(\frac{d}{dt} xs\right)^2 + \left(\frac{d^2}{drs^2} f\right)$$

$$\left.\left.\left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx2} rs\right) + \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx2} rs\right) \right) \right) \Bigg/ \left(3\, f^2 \left(\frac{d}{dt} xs\right)^2 + 1 \right)^2$$

$$R_{0,0,3,0} = \left(2\, f \left(\frac{d}{dt} xs\right) \left(\left(\frac{d}{drs} f\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d^2}{dt^2} xs\right) + 3\, f^3 \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dx1} rs\right)\right.\right.$$

$$\left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^4 + 3\, f^3 \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx3} rs\right) \left(\frac{d}{dt} xs\right)^4 + 3\, f^2 \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dt} rs\right)$$

$$\left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^3 - 3\, f \left(\frac{d}{drs} f\right)^2 \left(\frac{d}{dt} rs\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^3 + 3\, f^2 \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dt\,dx3} rs\right)$$

$$\left(\frac{d}{dt} xs\right)^3 + f \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^2 + \left(\frac{d}{drs} f\right)^2 \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^2$$

$$+ f \left(\frac{d}{drs} f\right) \left(\frac{d^2}{dx1\,dx3} rs\right) \left(\frac{d}{dt} xs\right)^2 + \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dt} rs\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right) + \left(\frac{d}{drs} f\right)$$

$$\left.\left.\left(\frac{d^2}{dt\,dx3} rs\right) \left(\frac{d}{dt} xs\right) \right) \right) \Bigg/ \left(3\, f^2 \left(\frac{d}{dt} xs\right)^2 + 1 \right)^2$$

$$R_{0,0,3,1} = - \left(2\, f \left(\frac{d}{dt} xs\right)^2 \left(3\, f^2 \left(\frac{d^2}{drs^2} f\right) \left(\frac{d}{dx1} rs\right) \left(\frac{d}{dx3} rs\right) \left(\frac{d}{dt} xs\right)^2 - 3\, f\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right))\,)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,1,0,1} = (\ 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^2$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 -$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) + 2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right))\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,1,0,2} = (\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 +$$

$$3\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,1,0,3} = (\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 +$$

$$3\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)$$

$$) \,/\, \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,1,1,0} = - \left(2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 3\,f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 3\right.$$

$$f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\,f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 -$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right) + 2$$

$$\left.\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)\right) \,/\, \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,1,1,2} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left.\left.\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\right)\right) \,/\, \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,1,1,3} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left.\left.\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\right)\right) \,/\, \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{0,1,2,0} = -\left(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\,f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4\right.$$

$$+ 3\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\,f$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}\,rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$\left.\right) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,1,2,1} = \left(\left(\frac{d}{d\,t}xs\right)\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\right)\right) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,1,3,0} = -\left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4\right.$$

$$+ 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$\left.\right) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,1,3,1} = \left(\left(\frac{d}{d\,t}xs\right)\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\right)\right) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,2,0,1} = \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + \right.$$

$$6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\Big)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{0,2,0,2}=-\ \Big(\ f\left(\frac{d}{dt}xs\right)^2\ \Big(\ 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2+3\ f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2-3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)+\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)^2\ \Big)\ \Big)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{0,2,0,3}=-\ \Big(\ f\left(\frac{d}{dt}xs\right)^2\ \Big(\ 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2-3\ f$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\Big)\ \Big)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{0,2,1,0}=-\ \Big(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right)-3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4$$

$$+6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4-3\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4+3$$

$$f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3-3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3+3\ f^2$$

$$\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3-f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2-f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\Big)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{0,2,1,2}=-\ \Big(\left(\frac{d}{dt}xs\right)\Big(\ 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2+3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2-3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)+\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\ \Big)$$

$$\Big)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{0,2,1,3}=-\ \Big(\left(\frac{d}{dt}xs\right)\Big(\ 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2-3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\Big)\ \Big)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{0,2,2,0} = \left(f \left(\frac{d}{d\,t}xs\right)^2 \left(3\ f^2 \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2 \left(\frac{d^2}{d\,rs^2}f\right) \right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left.\left.\left(\frac{d}{d\,x2}rs\right)^2 \right) \right) / \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1 \right)^2$$

$$R_{0,2,2,1} = \left(\left(\frac{d}{d\,t}xs\right) \left(3\ f^2 \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2 \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2 \right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2 \Big)$$

$$\Big) / \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1 \right)^2$$

$$R_{0,2,3,0} = \left(f \left(\frac{d}{d\,t}xs\right)^2 \left(3\ f^2 \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2 \right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2 \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left.\left.\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right) \right) \right) / \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1 \right)^2$$

$$R_{0,2,3,1} = \left(\left(\frac{d}{d\,t}xs\right) \left(3\ f^2 \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2 \right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2 \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left.\left.\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right) \right) \right) / \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1 \right)^2$$

$$R_{0,3,0,1} = \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^3 \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + \right.$$

$$6\ f^2 \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3 \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) \right) / \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1 \right)^2$$

$$R_{0,3,0,2} = - \left(f \left(\frac{d}{d\,t}xs\right)^2 \left(3\ f^2 \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f \right.\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\Big)\Big)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,3,0,3} = -\ \Big(\ f\left(\frac{d}{d\,t}xs\right)^2\ \Big(\ 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2\Big)\Big)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,3,1,0} = -\ \Big(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4$$

$$+ 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3$$

$$f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\Big)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,3,1,2} = -\ \Big(\left(\frac{d}{d\,t}xs\right)\Big(\ 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\Big)\Big)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,3,1,3} = -\ \Big(\left(\frac{d}{d\,t}xs\right)\Big(\ 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\Big)$$

$$\Big)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{0,3,2,0} = \Big(\ f\left(\frac{d}{d\,t}xs\right)^2\ \Big(\ 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\bigg)\bigg) \Big/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{0,3,2,1}=\left(\left(\frac{d}{d\,t}xs\right)\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2-3\,f\left(\frac{d}{d\,rs}f\right)^2\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\bigg)\bigg) \Big/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{0,3,3,0}=\left(f\left(\frac{d}{d\,t}xs\right)^2\left(3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\right.$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)+\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2\bigg)\bigg) \Big/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{0,3,3,1}=\left(\left(\frac{d}{d\,t}xs\right)\left(3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\right.$$

$$\left(\frac{d}{d\,t}xs\right)^2-3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\bigg)$$

$$\bigg) \Big/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,0,0,1}=-\left(\left(f\left(\frac{d}{d\,t}xs\right)-1\right)\left(f\left(\frac{d}{d\,t}xs\right)+1\right)\left(2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)-3\,f^2\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3-6\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3+6\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3-\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)+2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\bigg)\bigg) \Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,0,0,2}=-\left(\left(f\left(\frac{d}{d\,t}xs\right)-1\right)\left(f\left(\frac{d}{d\,t}xs\right)+1\right)\left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)+3\,f^3\right.\right.$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\Bigg)\Bigg) \Bigg/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,0,0,3} = -\Bigg(\left(f\left(\frac{d}{d\,t}xs\right)-1\right)\left(f\left(\frac{d}{d\,t}xs\right)+1\right)\Bigg(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^3$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\Bigg)\Bigg) \Bigg/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,0,1,0} = \Bigg(\left(f\left(\frac{d}{d\,t}xs\right)-1\right)\left(f\left(\frac{d}{d\,t}xs\right)+1\right)\Bigg(2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^2$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\Bigg)\Bigg) \Bigg/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,0,1,2} = \left(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right)-1\right)\left(f\left(\frac{d}{dt}xs\right)+1\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\right.\right.$$

$$\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left.\left.\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\right)\right) \bigg/ \left(3\,f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,0,1,3} = \left(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right)-1\right)\left(f\left(\frac{d}{dt}xs\right)+1\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\right.\right.$$

$$\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left.\left.\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\right)\right) \bigg/ \left(3\,f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,0,2,0} = \left(\left(f\left(\frac{d}{dt}xs\right)-1\right)\left(f\left(\frac{d}{dt}xs\right)+1\right)\left(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right)+3\,f^3\right.\right.$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\,f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\,f^2$$

$$\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)$$

$$\left.\left.\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\right)\right) \bigg/ \left(3\,f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,0,2,1} = -\left(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right)-1\right)\left(f\left(\frac{d}{dt}xs\right)+1\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)$$

$$\left.\left.\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\right)\right) \bigg/$$

$$\left(3\,f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,0,3,0} = \left(\left(f\left(\frac{d}{dt}xs\right)-1\right)\left(f\left(\frac{d}{dt}xs\right)+1\right)\left(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right)+3\,f^3\right.\right.$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\,f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\Bigg)\Bigg) \Bigg/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,0,3,1} = -\Bigg(\left(\frac{d}{d\,t}xs\right)\left(f\left(\frac{d}{d\,t}xs\right) - 1\right)\left(f\left(\frac{d}{d\,t}xs\right) + 1\right)\Bigg(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\Bigg)\Bigg)\Bigg/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,1,0,1} = \Bigg(2\,f\left(\frac{d}{d\,t}xs\right)\Bigg(2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\,f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$+ 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\Bigg)\Bigg) \Bigg/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,1,0,2} = \Bigg(2\,f\left(\frac{d}{d\,t}xs\right)\Bigg(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2$$

$$+ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\,)\,)\,\Big/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,1,0,3}=(\,2\,f\left(\frac{d}{d\,t}xs\right)\,(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3-3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3+f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2$$

$$+f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\,)\,)\,\Big/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,1,1,0}=-(\,2\,f\left(\frac{d}{d\,t}xs\right)\,(\,2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^4-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^3$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3-6\,f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3+6\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3-\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2-\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$+2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\,)\,)\,\Big/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,1,1,2}=-(\,2\,f\left(\frac{d}{d\,t}xs\right)^2\,(\,3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\,)\,)\,\Big/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,1,1,3}=-(\,2\,f\left(\frac{d}{d\,t}xs\right)^2\,(\,3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Bigg)\Bigg)\Bigg/\left(3f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,1,2,0}=-\Bigg(2f\left(\frac{d}{dt}xs\right)\Bigg(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right)+3f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4+3f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4+3f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3-3f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3+3f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3+f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)+\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\Bigg)\Bigg)\Bigg/\left(3f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,1,2,1}=\Bigg(2f\left(\frac{d}{dt}xs\right)^2\Bigg(3f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2-3f$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2+3f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\Bigg)\Bigg)\Bigg/\left(3f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,1,3,0}=-\Bigg(2f\left(\frac{d}{dt}xs\right)\Bigg(\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right)+3f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4+3f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4+3f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3-3f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3+3f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3+f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)+\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)\Bigg)\Bigg)\Bigg/\left(3f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,1,3,1}=\Bigg(2f\left(\frac{d}{dt}xs\right)^2\Bigg(3f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2-3f$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+3f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2+\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)+\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Bigg)\Bigg)\Bigg/\left(3f^2\left(\frac{d}{dt}xs\right)^2+1\right)^2$$

$$R_{1,2,0,1} = \left(\left(\frac{d}{dt}xs\right)\left(2\,f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\,f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 6\,f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\,f^2\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\,f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\,f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 2\,f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + 2\,f\left(\frac{d}{drs}f\right)$$

$$\left.\left.\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\right)\right) \middle/$$

$$\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,2,0,2} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\right.\right.$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 4\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\,f^2$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) +$$

$$\left.\left.\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\right)\right) \middle/ \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,2,0,3} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 4\,f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\,f^2\left(\frac{d}{drs}f\right)$$

$$\left.\left.\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\right)\right) \middle/$$

$$\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,2,1,0} = -\left(\left(\frac{d}{dt}xs\right)\left(2\,f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\,f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f^2\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\ f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\ f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\Bigg)\Bigg)\ /$$

$$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,2,1,2} = -\left(\left(\frac{d}{d\,t}xs\right)^2\ \left(6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + 2\ f$$

$$\left.\left.\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\right)\right)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,2,1,3} = -\left(\left(\frac{d}{d\,t}xs\right)^2\ \left(6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left.\left.\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right) + 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\right)\right)\ /$$

$$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,2,2,0} = -\left(\left(\frac{d}{d\,t}xs\right)\ \left(3\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 4\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\ f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) +$$

$$\left.\left.\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\right)\right)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$R_{1,2,2,1} = \left(\left(\frac{d}{d\,t}xs\right)^2\ \left(6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^2 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + 2\ f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\ )\ )\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,2,3,0} = -\ (\left(\frac{d}{dt}xs\right)\ (\ 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\ )\ )\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,2,3,1} = (\left(\frac{d}{dt}xs\right)^2\ (\ 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f^2\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 2\ f\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\ )\ )\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,3,0,1} = (\left(\frac{d}{dt}xs\right)\ (\ 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\ )\ )\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,3,0,2} = (\left(\frac{d}{dt}xs\right)\ (\ 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 4\,f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\,f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\Big)\Big) /$$

$$\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,3,0,3} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\right.$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 4\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\,f^2$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) +$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\Big)\Big) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,3,1,0} = -\left(\left(\frac{d}{dt}xs\right)\left(2\,f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\,f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right.$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 6\,f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\,f^2\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\,f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\,f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 2\,f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + 2\,f\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Big)\Big) /$$

$$\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$R_{1,3,1,2} = -\left(\left(\frac{d}{dt}xs\right)^2\left(6\,f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f^2\left(\frac{d}{drs}f\right)^2\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 6\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 2\,f\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right) + 2\,f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\Big)\Big) /$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,3,1,3}=-\left(\left(\frac{d}{d\,t}xs\right)^2\left(6\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+6\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\right.\right.$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)+2\,f$$

$$\left.\left.\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\right)\right)\Big/\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,3,2,0}=-\left(\left(\frac{d}{d\,t}xs\right)\left(3\,f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4+4\,f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+4\,f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left.\left.\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\right)\right)\Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,3,2,1}=\left(\left(\frac{d}{d\,t}xs\right)^2\left(6\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+6\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+2\,f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left.\left.\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)+2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\right)\right)\Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,3,3,0}=-\left(\left(\frac{d}{d\,t}xs\right)\left(3\,f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+4\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+4\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)+$$

$$\left.\left.\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\right)\right)\Big/\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{1,3,3,1}=\left(\left(\frac{d}{d\,t}xs\right)^2\left(6\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+6\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^2-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)+2\,f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\,)\,)\,/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$R_{2,0,0,1}=\left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+\right.$$

$$3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\,/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)$$

$$R_{2,0,0,2}=\left(f\left(\frac{d}{d\,t}xs\right)^2\,\left(3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)+\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)^2\,)\,)\,/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)$$

$$R_{2,0,0,3}=\left(f\left(\frac{d}{d\,t}xs\right)^2\,\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\,)\,)\,/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)$$

$$R_{2,0,1,0}=-\left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4\right.$$

$$+3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\,/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)$$

$$R_{2,0,1,2} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\right.\right.$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\Bigg)\Bigg)$$

$$/\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{2,0,1,3} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\Bigg)\Bigg) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{2,0,2,0} = -\left(f\left(\frac{d}{dt}xs\right)^2\left(3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d^2}{drs^2}f\right)\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)^2\Bigg)\Bigg) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{2,0,2,1} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\right.\right.$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\Bigg)\Bigg)$$

$$/\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{2,0,3,0} = -\left(f\left(\frac{d}{dt}xs\right)^2\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\Bigg)\Bigg) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{2,0,3,1} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\Bigg)\Bigg) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{2,1,0,1} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)))\ /\ (\ 3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\ )$$

$$R_{2,1,0,2} = -\ (\left(\frac{d}{d\,t}xs\right)(\ 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\ )\ )$$

$$/\ (\ 3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\ )$$

$$R_{2,1,0,3} = -\ (\left(\frac{d}{d\,t}xs\right)(\ 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)))\ /\ (\ 3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\ )$$

$$R_{2,1,1,0} = (\left(\frac{d}{d\,t}xs\right)(\ 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right))\ )\ /\ (\ 3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\ )$$

$$R_{2,1,1,2} = \frac{\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2}{3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$R_{2,1,1,3} = \frac{\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2}{3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$R_{2,1,2,0} = (\left(\frac{d}{d\,t}xs\right)(\ 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\ )\ )$$

$$/\ (\ 3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\ )$$

$$R_{2,1,2,1} = -\ \frac{\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2}{3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$R_{2,1,3,0} = (\left(\frac{d}{dt}xs\right) (3\, f^2 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f \left(\frac{d}{drs}f\right)^2$

$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\, f^2 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)$

$\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right))) / (3\, f^2 \left(\frac{d}{dt}xs\right)^2 + 1)$

$R_{2,1,3,1} = - \dfrac{\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2}{3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1}$

$R_{3,0,0,1} = (\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\, f^3 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 +$

$3\, f^3 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\, f^2 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\, f$

$\left(\frac{d}{drs}f\right)^2 \left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\, f^2 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + f \left(\frac{d^2}{drs^2}f\right)$

$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2 \left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f \left(\frac{d}{drs}f\right)$

$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)$

$) / (3\, f^2 \left(\frac{d}{dt}xs\right)^2 + 1)$

$R_{3,0,0,2} = (f \left(\frac{d}{dt}xs\right)^2 (3\, f^2 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f \left(\frac{d}{drs}f\right)^2$

$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\, f^2 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)$

$\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right))) / (3\, f^2 \left(\frac{d}{dt}xs\right)^2 + 1)$

$R_{3,0,0,3} = (f \left(\frac{d}{dt}xs\right)^2 (3\, f^2 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\, f^2 \left(\frac{d^2}{drs^2}f\right)$

$\left(\frac{d}{dx3}rs\right)^2 \left(\frac{d}{dt}xs\right)^2 + f \left(\frac{d}{drs}f\right)^2 \left(\frac{d}{dx3}rs\right)^2 \left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)$

$\left(\frac{d}{dx3}rs\right)^2)) / (3\, f^2 \left(\frac{d}{dt}xs\right)^2 + 1)$

$R_{3,0,1,0} = - (\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\, f^3 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4$

$+ 3\, f^3 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\, f^2 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\, f$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\;f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\;/\;(\;3\;f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\;)$$

$$R_{3,0,1,2} = -\;(\left(\frac{d}{d\,t}xs\right)\;(\;3\;f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\;f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\;)\;)\;/\;(\;3\;f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\;)$$

$$R_{3,0,1,3} = -\;(\left(\frac{d}{d\,t}xs\right)\;(\;3\;f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\;f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\;)\;)$$

$$/\;(\;3\;f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\;)$$

$$R_{3,0,2,0} = -\;(\;f\left(\frac{d}{d\,t}xs\right)^2\;(\;3\;f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\;f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\;)\;)\;/\;(\;3\;f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\;)$$

$$R_{3,0,2,1} = (\left(\frac{d}{d\,t}xs\right)\;(\;3\;f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\;f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\;)\;)\;/\;(\;3\;f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\;)$$

$$R_{3,0,3,0} = -\;(\;f\left(\frac{d}{d\,t}xs\right)^2\;(\;3\;f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\;f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2\;)\;)\;/\;(\;3\;f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\;)$$

$$R_{3,0,3,1} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\right.\right.$$

$$\left.\left.\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\right)\right)$$

$$/\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{3,1,0,1} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left.\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right.$$

$$\left.\left.\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\right)\right) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{3,1,0,2} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left.\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\right.$$

$$\left.\left.\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2\,dx3}rs\right)\right)\right) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{3,1,0,3} = -\left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\right.\right.$$

$$\left.\left.\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\right)\right)$$

$$/\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{3,1,1,0} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left.\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right.$$

$$\left.\left.\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\right)\right) / \left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)$$

$$R_{3,1,1,2} = \frac{\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2}{3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$R_{3,1,1,3} = \frac{\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2}{3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1}$$

$$R_{3,1,2,0} = \left(\left(\frac{d}{dt}xs\right)\left(3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\,)\,)\,/\,(\,3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\,)$$

$$R_{3,1,2,1} = -\frac{\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2}{3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

$$R_{3,1,3,0} = (\left(\frac{d}{d\,t}xs\right)\,(\,3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\,)\,)$$

$$/\,(\,3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\,)$$

$$R_{3,1,3,1} = -\frac{\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2}{3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1}$$

```
(%i15)  /* Ricci tensor Ric[mu,nu] */
        for mu:0 thru 3 do {
        for nu:0 thru 3 do {
            Ric[mu,nu]: sum(R[lambda,mu,lambda,nu], lambda, 0, 3)
        }}$
```

```
(%i16)  /* dislplay Ric's being different from zero */
        for i:0 thru 3 do {
        for j:0 thru 3 do {
            Ric[i,j] : /*ratsimp*/(factor(Ric[i,j])),
            if Ric[i,j] # 0 then display(Ric[i,j])
            }}$
```

$$Ric_{0,0} = (\,2\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^2\left(\frac{d^2}{d\,t^2}xs\right) - 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 9$$

$$f^5\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^6 - 9\ f^5\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6 - 6\ f^4\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6 - 9\ f^5\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^6 - 9\ f^5\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^6 - 6\ f^4\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6 + 3\ f^5\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^6 + 3\ f^5$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6 + 6\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^5 - 6\ f^3\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^5 + 6\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^5 - 6\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^4 - 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + f^2$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 2\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 2\ f^3\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3 + 6\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 4\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3$$

$$- f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 -$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) - 2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\bigg)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$Ric_{0,1} = -\ \Bigg(\left(\frac{d}{d\,t}xs\right)\Bigg(4\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 9\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^4 - 9\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 9$$

$$f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 9\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^4 + 12\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 12\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3 + 12\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 6$$

$$f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 6\ f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 6\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2$$

$$+ 2\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 2\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 4\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) + 4\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right) - \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) - \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2 - \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) - \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)^2\ )\ )\ \Big/\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$Ric_{0,2} = -\ (\left(\frac{d}{d\,t}xs\right)\ (\ 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^4\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f^2\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\ f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\ f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\ )\ )\ \Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$Ric_{0,3} = -\ (\left(\frac{d}{d\,t}xs\right)\ (\ 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^4\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f^2\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\ f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\ f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\ )\ )\ \Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$Ric_{1,0} = -\left(\left(\frac{d}{dt}xs\right)\left(4\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 9\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\right.\right.$$

$$\left(\frac{d}{dt}xs\right)^4 - 9\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 9$$

$$f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^4 - 9\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 3\ f^3\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 6\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^4 + 12\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 12\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 12\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 6$$

$$f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 6\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 6\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2$$

$$+ 2\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 2\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 4\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right) + 4\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)$$

$$\left(\frac{d}{dt}xs\right) - \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) - \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2 - \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) - \left(\frac{d^2}{drs^2}f\right)$$

$$\left.\left.\left(\frac{d}{dx2}rs\right)^2\right)\right) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$Ric_{1,1} = \left(2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 6\ f^2\right.$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2$$

$$- 2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right) + 2$$

$$\left.\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)\right) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

$$Ric_{1,2} = \left(\left(\frac{d}{d\,rs}f \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d^2}{d\,t^2}xs \right) - 3\,f^3 \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^4 + 6 \right.$$

$$f^2 \left(\frac{d}{d\,rs}f \right)^2 \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^4 - 3\,f^3 \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,x1\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,t}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^3 - 3\,f \left(\frac{d}{d\,rs}f \right)^2 \left(\frac{d}{d\,t}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,t\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^3 - f \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^2 + \left(\frac{d}{d\,rs}f \right)^2$$

$$\left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^2 - f \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,x1\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^2 + \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,t}rs \right)$$

$$\left. \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right) + \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,t\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right) \right) \Big/ \left(3\,f^2 \left(\frac{d}{d\,t}xs \right)^2 + 1 \right)^2$$

$$Ric_{1,3} = \left(\left(\frac{d}{d\,rs}f \right) \left(\frac{d}{d\,x3}rs \right) \left(\frac{d^2}{d\,t^2}xs \right) - 3\,f^3 \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^4 + 6 \right.$$

$$f^2 \left(\frac{d}{d\,rs}f \right)^2 \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^4 - 3\,f^3 \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,x1\,d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,t}rs \right) \left(\frac{d}{d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^3 - 3\,f \left(\frac{d}{d\,rs}f \right)^2 \left(\frac{d}{d\,t}rs \right) \left(\frac{d}{d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,t\,d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^3 - f \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^2 + \left(\frac{d}{d\,rs}f \right)^2$$

$$\left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^2 - f \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,x1\,d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right)^2 + \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,t}rs \right)$$

$$\left. \left(\frac{d}{d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right) + \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,t\,d\,x3}rs \right) \left(\frac{d}{d\,t}xs \right) \right) \Big/ \left(3\,f^2 \left(\frac{d}{d\,t}xs \right)^2 + 1 \right)^2$$

$$Ric_{2,0} = - \left(\left(\frac{d}{d\,t}xs \right) \left(2\,f \left(\frac{d}{d\,rs}f \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d^2}{d\,t^2}xs \right) + 3\,f^4 \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,x1}rs \right) \right. \right.$$

$$\left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^4 + 3\,f^3 \left(\frac{d}{d\,rs}f \right)^2 \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^4 + 3\,f^4 \left(\frac{d}{d\,rs}f \right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^4 + 6\,f^3 \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,t}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^3 - 6\,f^2 \left(\frac{d}{d\,rs}f \right)^2$$

$$\left(\frac{d}{d\,t}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^3 + 6\,f^3 \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,t\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^3 + 4\,f^2 \left(\frac{d^2}{d\,rs^2}f \right)$$

$$\left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^2 - f \left(\frac{d}{d\,rs}f \right)^2 \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^2 + 4\,f^2 \left(\frac{d}{d\,rs}f \right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right)^2 + 2\,f \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,t}rs \right) \left(\frac{d}{d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right) + 2\,f \left(\frac{d}{d\,rs}f \right)$$

$$\left. \left. \left(\frac{d^2}{d\,t\,d\,x2}rs \right) \left(\frac{d}{d\,t}xs \right) + \left(\frac{d^2}{d\,rs^2}f \right) \left(\frac{d}{d\,x1}rs \right) \left(\frac{d}{d\,x2}rs \right) + \left(\frac{d}{d\,rs}f \right) \left(\frac{d^2}{d\,x1\,d\,x2}rs \right) \right) \right) \Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$Ric_{2,1} = \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\right.$$

$$f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\right) / \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$Ric_{2,2} = -\left(\left(\frac{d}{d\,t}xs\right)^2\left(9\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 9\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^2 - 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 3\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + 3\,f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left.\left.\left(\frac{d}{d\,x2}rs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\right)\right) / \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$Ric_{2,3} = -\left(\left(\frac{d}{d\,t}xs\right)^2\left(9\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 9\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left.\left.\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right) + 3\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\right)\right) /$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

$$Ric_{3,0} = -\left(\left(\frac{d}{d\,t}xs\right)\left(2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.\right.$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^4\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\,f^2\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 4\,f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\,f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 2\,f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\,f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\,\Big)\,\Big)\;/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$Ric_{3,1} = \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\right.$$

$$f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\right) \Big/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$Ric_{3,2} = -\left(\left(\frac{d}{d\,t}xs\right)^2\left(9\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 9\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,x3}rs\right) + 3\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2\,d\,x3}rs\right)\,\right)\,\Big)\;/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

$$Ric_{3,3} = -\left(\left(\frac{d}{d\,t}xs\right)^2\left(9\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 9\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^2 - 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 3\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + 3\,f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\,\right)\,\Big)\;/\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

```
(%i17)  /* Ricci Scalar */
        RicSc: sum(gContr[0,lambda]*Ric[lambda,0], lambda, 0, 3)
            +  sum(gContr[1,lambda]*Ric[lambda,1], lambda, 0, 3)
            +  sum(gContr[2,lambda]*Ric[lambda,2], lambda, 0, 3)
            +  sum(gContr[3,lambda]*Ric[lambda,3], lambda, 0, 3)
        ;
```

(%o17)

$$-\left(2f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^2\left(\frac{d^2}{d\,t^2}xs\right)-2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)-9\right.$$

$$f^5\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^6-9\,f^5\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6-6\,f^4\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6-9\,f^5\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^6-9\,f^5\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^6-6\,f^4\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6+3\,f^5\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^6+3\,f^5$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^6+6\,f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^5-6\,f^3\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^5+6\,f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^5-6\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4-6\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^4-6\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4-6\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+f^2$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4-2\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4-2\,f^3\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4-4\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3+6\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3-4\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3$$

$$-f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)-2\left(\frac{d}{d\,rs}f\right)$$

$$\left.\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\right)/\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^3+\left(4\,f\left(\frac{d}{d\,t}xs\right)^2\left(4\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\right.\right.$$

$$\left(\frac{d^2}{d\,t^2}xs\right)-9\,f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4-9\,f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4-3\,f^3$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4-9\,f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4-9\,f^4\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4-3\,f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+6\,f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 12\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 - 12\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 12\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 6\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - f$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 6\ f^2\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+ 2\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 4\ f\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right) + 4\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right) - \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) -$$

$$\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2 - \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) - \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\ )\ )\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^3 -$$

$$\left(\left(f^2\left(\frac{d}{dt}xs\right)^2 - 1\right)\left(2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 -\right.\right.$$

$$6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2$$

$$- 2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right) + 2$$

$$\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)\ )\ )\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^3 - \left(\left(\frac{d}{dt}xs\right)^2\ \left(9\ f^3\left(\frac{d}{drs}f\right)\right.\right.$$

$$\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 9\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 + 3\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + 3\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\ )\ )\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \left(\left(\frac{d}{dt}xs\right)^2\ \left(9\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 9\ f^3\left(\frac{d^2}{drs^2}f\right)\right.\right.$$

$$\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 3\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) + 3\ f$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\,\Bigg)\,\Bigg)\,\Bigg/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

(%i18) ratsimp(RicSc);

(%o18) $\left(\ 4\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d}{d\,x1}rs\right)\left(\dfrac{d^2}{d\,t^2}xs\right) + \left(\ -18\ f^3\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d^2}{d\,x3^2}rs\right)+\right.\right.$

$\left(6\,f^2\left(\dfrac{d}{d\,rs}f\right)^2 - 18\,f^3\left(\dfrac{d^2}{d\,rs^2}f\right)\right)\left(\dfrac{d}{d\,x3}rs\right)^2 - 18\,f^3\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d^2}{d\,x2^2}rs\right)+$

$\left(6\,f^2\left(\dfrac{d}{d\,rs}f\right)^2 - 18\,f^3\left(\dfrac{d^2}{d\,rs^2}f\right)\right)\left(\dfrac{d}{d\,x2}rs\right)^2 + 6\,f^3\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d^2}{d\,x1^2}rs\right) + 6\,f^3\left(\dfrac{d^2}{d\,rs^2}f\right)$

$\left(\dfrac{d}{d\,x1}rs\right)^2\,\Big)\left(\dfrac{d}{d\,t}xs\right)^4 +$

$\left(\left(12\,f^2\left(\dfrac{d^2}{d\,rs^2}f\right) - 12\,f\left(\dfrac{d}{d\,rs}f\right)^2\right)\left(\dfrac{d}{d\,t}rs\right)\left(\dfrac{d}{d\,x1}rs\right) + 12\,f^2\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d^2}{d\,t\,d\,x1}rs\right)\right)\left(\dfrac{d}{d\,t}xs\right)^3 +$

$\left(\ -6\ f\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d^2}{d\,x3^2}rs\right) + \left(\ -6\,f\left(\dfrac{d^2}{d\,rs^2}f\right) - 4\left(\dfrac{d}{d\,rs}f\right)^2\right)\left(\dfrac{d}{d\,x3}rs\right)^2 - 6\,f\left(\dfrac{d}{d\,rs}f\right)\right.$

$\left(\dfrac{d^2}{d\,x2^2}rs\right) + \left(\ -6\,f\left(\dfrac{d^2}{d\,rs^2}f\right) - 4\left(\dfrac{d}{d\,rs}f\right)^2\right)\left(\dfrac{d}{d\,x2}rs\right)^2 + 2\,f\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d^2}{d\,x1^2}rs\right)+$

$\left(2\,f\left(\dfrac{d^2}{d\,rs^2}f\right) + 2\left(\dfrac{d}{d\,rs}f\right)^2\right)\left(\dfrac{d}{d\,x1}rs\right)^2\,\Big)\left(\dfrac{d}{d\,t}xs\right)^2 +$

$\left(4\left(\dfrac{d^2}{d\,rs^2}f\right)\left(\dfrac{d}{d\,t}rs\right)\left(\dfrac{d}{d\,x1}rs\right) + 4\left(\dfrac{d}{d\,rs}f\right)\left(\dfrac{d^2}{d\,t\,d\,x1}rs\right)\right)\left(\dfrac{d}{d\,t}xs\right)\,\Big)\,\Bigg/\,\left(\ 9\,f^4\left(\dfrac{d}{d\,t}xs\right)^4 + 6\,f^2\right.$

$\left(\dfrac{d}{d\,t}xs\right)^2 + 1\ \right)$

(%i19)

```
/* Test for R^q */
for mu:   0 thru 3 do (
for sigma:0 thru 3 do (
for nu:   0 thru 3 do (
for rho:  0 thru 3 do (
    R_q: R[mu,sigma,nu,rho] + R[mu,rho,sigma,nu] + R[mu,nu,rho,sigma],
    if R_q # 0 then (
        display("=============Einstein equation R^q=0 not fulfilled! "),
        display(mu,sigma,nu,rho),
        display(R_q)
    )
)))));
```

=============Einstein equation R^q=0 not fulfilled! =

=============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 0

$\nu = 1$

$\rho = 2$

$R\_q = -\left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\right.$

$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f$

$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$

$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$

$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$

$\left.\right) / \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 + \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$

$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3\left(\frac{d}{d\,rs}f\right)$

$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$

$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$

$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$

$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\left.\right) /$

$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 + \left(2\ f\left(\frac{d}{d\,t}xs\right)^2\left(3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\right.\right.$

$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$

$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left.\right)\left.\right) / \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$

=============Einstein equation R^q=0 not fulfilled! =

=============Einstein equation R^q=0 not fulfilled!

$\mu = 0$

$\sigma = 0$

$\nu = 1$

$\rho = 3$

$R\_q = -\left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\right.$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 + \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\right)\ /$$

$$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 + \left(2\ f\left(\frac{d}{d\,t}xs\right)^2\left(3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\right.\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left.\right)\left.\right)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

==============Einstein equation R^q=0 not fulfilled! =
==============Einstein equation R^q=0 not fulfilled!

$\mu = 0$

$\sigma = 0$

$\nu = 2$

$\rho = 1$

$$R\_q = \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\right.$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$\left.\right) / \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\right) /$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - \left(2\,f\left(\frac{d}{d\,t}xs\right)^2\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\right.\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left.\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\right)\right) / \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =

=============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 0

ν = 3

ρ = 1

$$R\_q = \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\right.$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$) \; / \; \left(3 \, f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2 - \left(\left(\frac{d}{d\,rs} f \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d^2}{d\,t^2} xs \right) - 3 \, f^3 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x1} rs \right) \right.$$

$$\left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^4 + 6 \, f^2 \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^4 - 3 \, f^3 \left(\frac{d}{d\,rs} f \right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^4 + 3 \, f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,t} rs \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^3 - 3 \, f \left(\frac{d}{d\,rs} f \right)^2$$

$$\left(\frac{d}{d\,t} rs \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^3 + 3 \, f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,t\,d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^3 - f \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x1} rs \right)$$

$$\left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^2 - f \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x1\,d\,x3} rs \right)$$

$$\left(\frac{d}{d\,t} xs \right)^2 + \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,t} rs \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right) + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,t\,d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right) \Big) \; /$$

$$\left(3 \, f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2 - \left(2 \, f \left(\frac{d}{d\,t} xs \right)^2 \left(3 \, f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^2 - 3 \, f \right. \right.$$

$$\left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + 3 \, f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x1\,d\,x3} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + \left(\frac{d^2}{d\,rs^2} f \right)$$

$$\left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x3} rs \right) + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x1\,d\,x3} rs \right) \Big) \Big) \; / \; \left(3 \, f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2$$

============Einstein equation R^q=0 not fulfilled! =
============Einstein equation R^q=0 not fulfilled!

$\mu = 0$

$\sigma = 1$

$\nu = 0$

$\rho = 2$

$$R\_q = \left(\left(\frac{d}{d\,rs} f \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d^2}{d\,t^2} xs \right) + 3 \, f^3 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^4 + 3 \, f^3 \right.$$

$$\left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x1\,d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^4 + 3 \, f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,t} rs \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^3 - 3 \, f$$

$$\left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,t} rs \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^3 + 3 \, f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,t\,d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^3 + f \left(\frac{d^2}{d\,rs^2} f \right)$$

$$\left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + f \left(\frac{d}{d\,rs} f \right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,t} rs \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right) + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,t\,d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)$$

$$) \; / \; \left(3 \, f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2 - \left(\left(\frac{d}{d\,rs} f \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d^2}{d\,t^2} xs \right) - 3 \, f^3 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x1} rs \right) \right.$$

$$\left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^4 + 6 \, f^2 \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x1} rs \right) \left(\frac{d}{d\,x2} rs \right) \left(\frac{d}{d\,t} xs \right)^4 - 3 \, f^3 \left(\frac{d}{d\,rs} f \right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\right) /$$

$$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - (\ 2\ f\left(\frac{d}{d\,t}xs\right)^2\ (\ 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\ )\ )\ /\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

============Einstein equation R^q=0 not fulfilled! =
============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 1

ν = 0

ρ = 3

$$R\_q = (\ \left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\ /\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - (\ \left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\,)\;/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2-(\,2\,f\left(\frac{d}{d\,t}xs\right)^2\,(\,3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\,)\,)\;/\;\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 1

ν = 2

ρ = 0

$$R\_q=-\,(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^3$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\;/\;\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2+(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)-3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4-3\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-3\,f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\,)\;/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2 + \left(\,2\,f\left(\frac{d}{d\,t}xs\right)^2\,\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\right.\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\,\right)\,\right) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 1

ν = 3

ρ = 0

$$R\_q = -\,\left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\right.$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$\left.\right) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2 + \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\right) \,/\,$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2 + \left(\,2\,f\left(\frac{d}{d\,t}xs\right)^2\,\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\right.\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\,)\,)\,\Big/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

============Einstein equation R^q=0 not fulfilled! =

============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 2

ν = 0

ρ = 1

$$R\_q = -\,(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^3$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$)\,\Big/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2+(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)-3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4-3\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4+3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-3\,f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3-f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2-f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right))\,\Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2+(2\,f\left(\frac{d}{d\,t}xs\right)^2\,(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2-3\,f$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)+\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right))\,)\,\Big/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^2$$

============Einstein equation R^q=0 not fulfilled! =

============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 2

ν = 1

ρ = 0

$R\_q = \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\right.$

$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f$

$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$

$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$

$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)$

$\left.\right) / \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$

$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^3\left(\frac{d}{d\,rs}f\right)$

$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2$

$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$

$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$

$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)\left.\right) /$

$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - \left(2\,f\left(\frac{d}{d\,t}xs\right)^2\left(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\right.\right.$

$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$

$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left.\right)\left.\right) / \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$

=============Einstein equation R^q=0 not fulfilled! =

=============Einstein equation R^q=0 not fulfilled!

μ = 0

σ = 3

ν = 0

ρ = 1

$R\_q = -\,\Big(\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d^2}{d\,t^2}xs\Big) + 3\,f^3\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^4 + 3\,f^3$

$\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,x1\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^4 + 3\,f^2\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,t}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^3 - 3\,f$

$\Big(\dfrac{d}{d\,rs}f\Big)^2\Big(\dfrac{d}{d\,t}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^3 + 3\,f^2\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,t\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^3 + f\Big(\dfrac{d^2}{d\,rs^2}f\Big)$

$\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 + \Big(\dfrac{d}{d\,rs}f\Big)^2\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 + f\Big(\dfrac{d}{d\,rs}f\Big)$

$\Big(\dfrac{d^2}{d\,x1\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 + \Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,t}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big) + \Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,t\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)$

$\Big)\,/\,\Big(3\,f^2\Big(\dfrac{d}{d\,t}xs\Big)^2 + 1\Big)^2 + \Big(\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d^2}{d\,t^2}xs\Big) - 3\,f^3\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,x1}rs\Big)$

$\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^4 + 6\,f^2\Big(\dfrac{d}{d\,rs}f\Big)^2\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^4 - 3\,f^3\Big(\dfrac{d}{d\,rs}f\Big)$

$\Big(\dfrac{d^2}{d\,x1\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^4 + 3\,f^2\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,t}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^3 - 3\,f\Big(\dfrac{d}{d\,rs}f\Big)^2$

$\Big(\dfrac{d}{d\,t}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^3 + 3\,f^2\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,t\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^3 - f\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,x1}rs\Big)$

$\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 + \Big(\dfrac{d}{d\,rs}f\Big)^2\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 - f\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,x1\,d\,x3}rs\Big)$

$\Big(\dfrac{d}{d\,t}xs\Big)^2 + \Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,t}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big) + \Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,t\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)\Big)\,/$

$\Big(3\,f^2\Big(\dfrac{d}{d\,t}xs\Big)^2 + 1\Big)^2 + \Big(2\,f\Big(\dfrac{d}{d\,t}xs\Big)^2\,\Big(3\,f^2\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 - 3\,f$

$\Big(\dfrac{d}{d\,rs}f\Big)^2\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 + 3\,f^2\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,x1\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^2 + \Big(\dfrac{d^2}{d\,rs^2}f\Big)$

$\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big) + \Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,x1\,d\,x3}rs\Big)\Big)\,\Big)\,/\,\Big(3\,f^2\Big(\dfrac{d}{d\,t}xs\Big)^2 + 1\Big)^2$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

$\mu = 0$

$\sigma = 3$

$\nu = 1$

$\rho = 0$

$R\_q = \Big(\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d^2}{d\,t^2}xs\Big) + 3\,f^3\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,x1}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^4 + 3\,f^3$

$\Big(\dfrac{d}{d\,rs}f\Big)\Big(\dfrac{d^2}{d\,x1\,d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^4 + 3\,f^2\Big(\dfrac{d^2}{d\,rs^2}f\Big)\Big(\dfrac{d}{d\,t}rs\Big)\Big(\dfrac{d}{d\,x3}rs\Big)\Big(\dfrac{d}{d\,t}xs\Big)^3 - 3\,f$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)$$

$$\Big)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - \left(\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\Big)\ /$$

$$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - \left(2\ f\left(\frac{d}{d\,t}xs\right)^2\ \left(3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\ f\right.\right.$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\Big)\Big)\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

$\mu = 1$

$\sigma = 0$

$\nu = 1$

$\rho = 2$

$$R\_q = \left(\left(\frac{d}{d\,t}xs\right)\left(2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\right.\right.$$

$$\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3 + 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+ 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)))\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - (\ 2\ f\left(\frac{d}{dt}xs\right)($$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)))\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + \left(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\ \left(3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)))\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

============Einstein equation R^q=0 not fulfilled! =
============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 0

ν = 1

ρ = 3

$$R\_q = \left(\left(\frac{d}{dt}xs\right)\ \left(2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\right.\right.$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2$$

$$+ 2\,f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\Big)\Big) \Big/ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 - \Big(2\,f\left(\frac{d}{d\,t}xs\right)\Big($$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 3\,f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)\Big)\Big) \Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2 + \Big(\left(\frac{d}{d\,t}xs\right)\left(f\left(\frac{d}{d\,t}xs\right) - 1\right)\left(f\left(\frac{d}{d\,t}xs\right) + 1\right)\Big(3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\Big)\Big)\Big) \Big/$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^2$$

==============Einstein equation R^q=0 not fulfilled! =
==============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 0

ν = 2

ρ = 1

$$R\_q = -\Big(\left(\frac{d}{d\,t}xs\right)\Big(2\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) + 3\,f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3 + 6\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x2}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 4\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+\ 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\bigg)\ \bigg)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + \bigg(\ 2\ f\left(\frac{d}{dt}xs\right)\bigg($$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\bigg)\ \bigg)\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \bigg(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\bigg(3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\bigg)\ \bigg)\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =

=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 0

ν = 3

ρ = 1

$$R\_q = -\ \bigg(\left(\frac{d}{dt}xs\right)\bigg(2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+ 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Big)\Big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + \Big(\ 2\ f\left(\frac{d}{dt}xs\right)\Big($$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big) \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \Big(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\Big(3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Big)\Big) \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 1

ν = 0

ρ = 2

$$R\_q = -\ \Big(\left(\frac{d}{dt}xs\right)\Big(\ 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+\ 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\Big)\ \Big)\ \Big/\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2\ +\ \big(\ 2\ f\left(\frac{d}{dt}xs\right)\ \big($$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)\Big)\ \Big)\ \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \Big(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\ \big(\ 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x2}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x2}rs\right)\Big)\ \Big)\ \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 1

ν = 0

ρ = 3

$$R\_q = -\ \Big(\left(\frac{d}{dt}xs\right)\ \big(\ 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+\ 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Big)\Big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + \Big(\ 2\ f\left(\frac{d}{dt}xs\right)\Big($$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big) \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \left(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\left(3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right.$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Big)\Big) \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 1

ν = 2

ρ = 0

$$R\_q = \left(\left(\frac{d}{dt}xs\right)\left(\ 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\right.$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+ 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\Big)\Big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \Big(\ 2\ f\left(\frac{d}{dt}xs\right)\ \Big($$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big) \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + \Big(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\Big(3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\Big)\Big) \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 1

ν = 3

ρ = 0

$$R\_q = \Big(\left(\frac{d}{dt}xs\right)\ \Big(\ 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+\,2\,f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + 2\,f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\,)\,)\,/\,\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - (\,2\,f\left(\frac{d}{dt}xs\right)(\,$$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\,f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\,f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\,f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)\,)\,)\,/$$

$$\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + (\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)(\,3\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\,f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\,f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\,)\,)\,/$$

$$\left(3\,f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 2

ν = 0

ρ = 1

$$R\_q = (\left(\frac{d}{dt}xs\right)(\,2\,f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\,f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\,f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\,f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\,f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\,f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\,f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\,f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+ 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\,)\,)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - (\ 2\ f\left(\frac{d}{dt}xs\right)(\,$$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\,)\,)\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + (\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)(\ 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\,)\,)\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

==============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 2

ν = 1

ρ = 0

$$R\_q = -\ (\left(\frac{d}{dt}xs\right)(\ 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+\ 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\Big)\Big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2\ +\ \Big(\ 2\ f\left(\frac{d}{dt}xs\right)\Big($$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx2}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big)\ \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \left(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\Big(3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\right)$$

$$\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx2}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx2}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx2}rs\right)\Big)\Big)\ \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

μ = 1

σ = 3

ν = 0

ρ = 1

$$R\_q = \Big(\left(\frac{d}{dt}xs\right)\Big(\ 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+\ 2\ f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Big)\Big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \Big(\ 2\ f\left(\frac{d}{dt}xs\right)\Big($$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)\Big)\Big)\ \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + \Big(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\Big(3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx1\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right) + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)\Big)\Big)\ \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

=============Einstein equation R^q=0 not fulfilled! =
=============Einstein equation R^q=0 not fulfilled!

$\mu = 1$

$\sigma = 3$

$\nu = 1$

$\rho = 0$

$$R\_q = -\ \Big(\left(\frac{d}{dt}xs\right)\Big(\ 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^4\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1\,dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 4\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dx3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 4\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^2$$

$$+\ 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right) + 2\ f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\bigr)\bigr)\ /\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 + \left(\ 2\ f\left(\frac{d}{dt}xs\right)\right.$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d^2}{dt^2}xs\right) + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^3 - 3\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^3 + 3\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^3 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right)\bigr)\bigr)\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2 - \left(\left(\frac{d}{dt}xs\right)\left(f\left(\frac{d}{dt}xs\right) - 1\right)\left(f\left(\frac{d}{dt}xs\right) + 1\right)\left(3\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\right.\right.$$

$$\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,x3}rs\right) + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1\,d\,x3}rs\right)\bigr)\bigr)\ /$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

(%o19)   *done*

(%i20)   /* Raising of indices,
    contravarinat metric el. is g^x^x(contr.) = 1/g_x_x(cov.) */
    /*print("Riemann elements R^0_1^0^1, R^0_2^0^2, R^0_3^0^3:");*/

    R0101: f(0,1);
    R0202: f(0,2);
    R0303: f(0,3);

(%o20) $\left(\left(f^2\left(\frac{d}{dt}xs\right)^2 - 1\right)\left(2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\right.\right.$

$$\left(\frac{d}{dt}xs\right)^4 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f\left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{dt}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{dt\,d\,x1}rs\right)\left(\frac{d}{dt}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)$$

$$+\ 2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)\big)\big) \Big/ \left(3f^2\left(\frac{d}{dt}xs\right)^2+1\right)^4 - \big(\ 4\ f^2\left(\frac{d}{dt}xs\right)^2\ \big(\ 2$$

$$\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 3\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 3\ f^2\left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^4 + 6\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)$$

$$\left(\frac{d}{dt}xs\right)^3 + 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - \left(\frac{d}{drs}f\right)^2$$

$$\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 +$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right) + 2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)\big)\big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^4$$

(%o21) $\big(\ 3\ f\left(\frac{d}{dt}xs\right)^2\ \big(\ 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2$

$$\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\ \big)$$

$$\big)\ \Big/\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^3$$

(%o22) $\big(\ 3\ f\left(\frac{d}{dt}xs\right)^2\ \big(\ 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2$

$$\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\ \big)$$

$$\big)\ \Big/\ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2+1\right)^3$$

(%i23) R0101: factor(R0101);
       R0202: factor(R0202);
       R0303: factor(R0303);

(%o23) $-\big(\ 2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 3\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 3\ f^2$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 -$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) + 2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3$$

(%o24) $\left(3\,f\left(\frac{d}{d\,t}xs\right)^2\left(3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\right.$

$$\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2)$$

$$) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3$$

(%o25) $\left(3\,f\left(\frac{d}{d\,t}xs\right)^2\left(3\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 3\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\right.$

$$\left(\frac{d}{d\,t}xs\right)^2 - 3\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2)$$

$$) \,/\, \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3$$

(%i26) R1010: f(1,0);
        R1212: f(1,2);
        R1313: f(1,3);

(%o26) $\left(\left(f\left(\frac{d}{d\,t}xs\right) - 1\right)\left(f\left(\frac{d}{d\,t}xs\right) + 1\right)\left(f^2\left(\frac{d}{d\,t}xs\right)^2 - 1\right)\left(2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\right.$

$$\left(\frac{d^2}{d\,t^2}xs\right) - 3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 3$$

$$f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\,f^2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + f$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 + 2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\Bigg)\Bigg)\ /$$

$$\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^4 - \Bigg(4\ f^2\left(\frac{d}{d\,t}xs\right)^2\left(f\left(\frac{d}{d\,t}xs\right)-1\right)\left(f\left(\frac{d}{d\,t}xs\right)+1\right)\Bigg(2\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\ f^2$$

$$\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2$$

$$\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2$$

$$\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)\Bigg)\Bigg)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^4$$

(%o27) $\Bigg(\left(\frac{d}{d\,t}xs\right)^2\left(f^2\left(\frac{d}{d\,t}xs\right)^2 - 1\right)\Bigg(6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 6\ f^3$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x2^2}rs\right) + 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\Bigg)\Bigg)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3 - \Bigg($$

$$2\ f\left(\frac{d}{d\,t}xs\right)^2\Bigg(3\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 +$$

$$3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 4\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x2}rs\right)^2\Bigg)\Bigg)\ /\ \left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3$$

(%o28) $\Bigg(\left(\frac{d}{d\,t}xs\right)^2\left(f^2\left(\frac{d}{d\,t}xs\right)^2 - 1\right)\Bigg(6\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 6\ f^3$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2\ f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x3^2}rs\right) + 2\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\ )\ )\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3\ -\ ($$

$$2\ f\left(\frac{d}{d\,t}xs\right)^2\ (\ 3\ f^4\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^4\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 +$$

$$3\ f^3\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 4\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + 4\ f^2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right) + \left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x3}rs\right)^2\ )\ )\ /\ \left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3$$

<pre style="color:#c00">(%i29) R1010: factor(R1010);
        R1212: factor(R1212);
        R1313: factor(R1313);</pre>

(%o29) $-\ (\left(f\left(\frac{d}{d\,t}xs\right) - 1\right)\left(f\left(\frac{d}{d\,t}xs\right) + 1\right)\ (\ 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right) - 3\ f^2$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 - 3\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^4 + 3\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 6\ f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)$$

$$\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 - 6\ f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3 + 6\ f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^3 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d}{d\,rs}f\right)$$

$$\left(\frac{d^2}{d\,x1^2}rs\right)\left(\frac{d}{d\,t}xs\right)^2 + f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 2$$

$$\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right) + 2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\ )\ )\ /$$

$$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3$$

(%o30) $-\ (\left(\frac{d}{d\,t}xs\right)^2\ (\ 9\ f^4\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4 + 12\ f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)$

$$\left(\frac{d}{d\,t}xs\right)^2 + 12\ f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 - 6\ f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2 + 4$$

$$f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right) + 4\ f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x2}rs\right)^2 + \left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\ )\ )\ /$$

$$\left(3\ f^2\left(\frac{d}{d\,t}xs\right)^2 + 1\right)^3$$

(%o31)　$- \left(\left(\frac{d}{dt} xs \right)^2 \left(9 \ f^4 \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{dt} xs \right)^4 + 12 \ f^3 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) \right. \right.$

$\left(\frac{d}{dt} xs \right)^2 + 12 \ f^3 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 - 6 \ f^2 \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 + 4$

$\left. \left. f \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) + 4 \ f \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 + \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x3} rs \right)^2 \right) \right) \ /$

$\left(3 \ f^2 \left(\frac{d}{dt} xs \right)^2 + 1 \right)^3$

(%i32)　R2020: f(2,0);
　　　　R2121: f(2,1);
　　　　R2323: f(2,3);

(%o32)　$\left(f \left(\frac{d}{dt} xs \right)^2 \left(3 \ f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) \left(\frac{d}{dt} xs \right)^2 + 3 \ f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \right. \right.$

$\left. \left. \left(\frac{d}{dt} xs \right)^2 + f \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) + \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \right) \right)$

$/ \left(3 \ f^2 \left(\frac{d}{dt} xs \right)^2 + 1 \right)^2 - \left(2 \ f \left(\frac{d}{dt} xs \right)^2 \left(3 \ f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) \left(\frac{d}{dt} xs \right)^2 + 3 \ f^2 \right. \right.$

$\left. \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 - f \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) + \right.$

$\left. \left. \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \right) \right) / \left(3 \ f^2 \left(\frac{d}{dt} xs \right)^2 + 1 \right)^2$

(%o33)　$\dfrac{\left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 \left(f^2 \left(\frac{d}{dt} xs \right)^2 - 1 \right)}{\left(3 \ f^2 \left(\frac{d}{dt} xs \right)^2 + 1 \right)^2} - \left(2 \ f \left(\frac{d}{dt} xs \right)^2 \left(3 \ f^2 \left(\frac{d}{d\,rs} f \right) \right. \right.$

$\left. \left(\frac{d^2}{d\,x2^2} rs \right) \left(\frac{d}{dt} xs \right)^2 + 3 \ f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 - f \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 \right.$

$\left. \left. + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) + \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \right) \right) / \left(3 \ f^2 \left(\frac{d}{dt} xs \right)^2 + 1 \right)^2$

(%o34)　0

(%i35)　R2020: factor(R2020);
　　　　R2121: factor(R2121);
　　　　R2323: factor(R2323);

(%o35)　$- \left(f \left(\frac{d}{dt} xs \right)^2 \left(3 \ f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) \left(\frac{d}{dt} xs \right)^2 + 3 \ f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \right. \right.$

$\left. \left. \left(\frac{d}{dt} xs \right)^2 - 3 \ f \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{dt} xs \right)^2 + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) + \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \right) \right)$

$$) \; / \; \left(3 \; f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2$$

(%o36) $- \left(\left(\frac{d}{d\,t} xs \right)^2 \left(6 \; f^3 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + 6 \; f^3 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x2} rs \right)^2 \right. \right.$

$\left(\frac{d}{d\,t} xs \right)^2 - 3 \; f^2 \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x2} rs \right)^2 \left(\frac{d}{d\,t} xs \right)^2 + 2 \; f \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x2^2} rs \right) + 2 \; f \left(\frac{d^2}{d\,rs^2} f \right)$

$\left. \left. \left(\frac{d}{d\,x2} rs \right)^2 + \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x2} rs \right)^2 \right) \right) \; / \; \left(3 \; f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2$

(%o37) 0

(%i38) R3030: f(3,0);
        R3131: f(3,1);
        R3232: f(3,2);

(%o38) $\left(f \left(\frac{d}{d\,t} xs \right)^2 \left(3 \; f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + 3 \; f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \right. \right.$

$\left. \left. \left(\frac{d}{d\,t} xs \right)^2 + f \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{d\,t} xs \right)^2 + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) + \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \right) \right)$

$/ \; \left(3 \; f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2 - \left(2 \; f \left(\frac{d}{d\,t} xs \right)^2 \left(3 \; f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + 3 \; f^2 \right. \right.$

$\left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{d\,t} xs \right)^2 - f \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{d\,t} xs \right)^2 + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) +$

$\left. \left. \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \right) \right) \; / \; \left(3 \; f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2$

(%o39) $\dfrac{\left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{d\,t} xs \right)^2 \left(f^2 \left(\frac{d}{d\,t} xs \right)^2 - 1 \right)}{\left(3 \; f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2} - \left(2 \; f \left(\frac{d}{d\,t} xs \right)^2 \left(3 \; f^2 \left(\frac{d}{d\,rs} f \right) \right. \right.$

$\left(\frac{d^2}{d\,x3^2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + 3 \; f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{d\,t} xs \right)^2 - f \left(\frac{d}{d\,rs} f \right)^2 \left(\frac{d}{d\,x3} rs \right)^2 \left(\frac{d}{d\,t} xs \right)^2$

$\left. \left. + \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) + \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \right) \right) \; / \; \left(3 \; f^2 \left(\frac{d}{d\,t} xs \right)^2 + 1 \right)^2$

(%o40) 0

(%i41) R3030: factor(R3030);
        R3131: factor(R3131);
        R3232: factor(R3232);

(%o41) $- \left(f \left(\frac{d}{d\,t} xs \right)^2 \left(3 \; f^2 \left(\frac{d}{d\,rs} f \right) \left(\frac{d^2}{d\,x3^2} rs \right) \left(\frac{d}{d\,t} xs \right)^2 + 3 \; f^2 \left(\frac{d^2}{d\,rs^2} f \right) \left(\frac{d}{d\,x3} rs \right)^2 \right. \right.$

$$\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\ )$$

$$) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

(%o42) $\quad -\ \left(\left(\frac{d}{dt}xs\right)^2\ \left(6\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 6\ f^3\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\right.\right.$

$$\left(\frac{d}{dt}xs\right)^2 - 3\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\ f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + 2\ f\left(\frac{d^2}{drs^2}f\right)$$

$$\left.\left.\left(\frac{d}{dx3}rs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\right)\right) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^2$$

(%o43) $\quad 0$

(%i44) /* Coulomb law */
      DivE : R0101 + R0202 + R0303;

(%o44) $\quad -\ \Big(\ 2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d^2}{dt^2}xs\right) - 3\ f^2\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^4 - 3\ f^2$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^4 + 3\ f^3\left(\frac{d^2}{drs^2}f\right)$$

$$\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^4 + 6\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - 6\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dt}rs\right)$$

$$\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 + 6\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)^3 - \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 -$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx1}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx1}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right) + 2$$

$$\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\left(\frac{d}{dt}xs\right)\Big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^3 + \Big(\ 3\ f\left(\frac{d}{dt}xs\right)^2\ \Big(\ 3\ f^2\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 3\ f\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2$$

$$\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\ \Big)\ \Big) \Big/ \left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^3 + \Big(\ 3\ f$$

$$\left(\frac{d}{dt}xs\right)^2\ \Big(\ 3\ f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 3\ f^2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 3\ f$$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) + \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\ \Big)\ \Big) \Big/$$

$$\left(3\ f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^3$$

(%i45) `ratsimp(DivE);`

(%o45)
$$-\left(2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)+\left(-9\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)+\right.\right.$$

$$\left(6\,f^2\left(\frac{d}{d\,rs}f\right)^2-9\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\right)\left(\frac{d}{d\,x3}rs\right)^2-9\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)+$$

$$\left(6\,f^2\left(\frac{d}{d\,rs}f\right)^2-9\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\right)\left(\frac{d}{d\,x2}rs\right)^2+3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\right)\left(\frac{d}{d\,t}xs\right)^4+$$

$$\left(\left(6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)-6\,f\left(\frac{d}{d\,rs}f\right)^2\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)+6\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\right)\left(\frac{d}{d\,t}xs\right)^3+\left(-\right.$$

$$3\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x3^2}rs\right)+\left(-3\,f\left(\frac{d^2}{d\,rs^2}f\right)-\left(\frac{d}{d\,rs}f\right)^2\right)\left(\frac{d}{d\,x3}rs\right)^2-3\,f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x2^2}rs\right)+$$

$$\left(-3\,f\left(\frac{d^2}{d\,rs^2}f\right)-\left(\frac{d}{d\,rs}f\right)^2\right)\left(\frac{d}{d\,x2}rs\right)^2+f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)+\left(f\left(\frac{d^2}{d\,rs^2}f\right)+\left(\frac{d}{d\,rs}f\right)^2\right)$$

$$\left(\frac{d}{d\,x1}rs\right)^2\right)\left(\frac{d}{d\,t}xs\right)^2+\left(2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)+2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\right)\left(\frac{d}{d\,t}xs\right)\right)\,/\,($$

$$27\,f^6\left(\frac{d}{d\,t}xs\right)^6+27\,f^4\left(\frac{d}{d\,t}xs\right)^4+9\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\,)$$

(%i46) `/* J[r] */`
`Jr : -(R1010 + R1212 + R1313);`

(%o46)
$$\left(\left(f\left(\frac{d}{d\,t}xs\right)-1\right)\left(f\left(\frac{d}{d\,t}xs\right)+1\right)\left(2\left(\frac{d}{d\,rs}f\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d^2}{d\,t^2}xs\right)-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\right.\right.$$

$$\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4-3\,f^2\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^4+3\,f^3\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^4+6\,f^2\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3$$

$$-6\,f\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3+6\,f^2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)^3-$$

$$\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x3}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2-\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x2}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,x1^2}rs\right)$$

$$\left(\frac{d}{d\,t}xs\right)^2+f\left(\frac{d^2}{d\,rs^2}f\right)\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+\left(\frac{d}{d\,rs}f\right)^2\left(\frac{d}{d\,x1}rs\right)^2\left(\frac{d}{d\,t}xs\right)^2+2\left(\frac{d^2}{d\,rs^2}f\right)$$

$$\left(\frac{d}{d\,t}rs\right)\left(\frac{d}{d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)+2\left(\frac{d}{d\,rs}f\right)\left(\frac{d^2}{d\,t\,d\,x1}rs\right)\left(\frac{d}{d\,t}xs\right)\right)\right)\,/\,\left(3\,f^2\left(\frac{d}{d\,t}xs\right)^2+1\right)^3+\left(\right.$$

$$\left(\frac{d}{dt}xs\right)^2 \left(\; 9\; f^4 \left(\frac{d}{drs}f\right)^2 \left(\frac{d}{dx3}rs\right)^2 \left(\frac{d}{dt}xs\right)^4 + 12\; f^3 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 12\right.$$

$$f^3 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 6\; f^2 \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 4\; f\left(\frac{d}{drs}f\right)$$

$$\left.\left(\frac{d^2}{dx3^2}rs\right) + 4\; f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx3}rs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2\;\right)\;\right) \Big/ \left(3\; f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^3 + \Big($$

$$\left(\frac{d}{dt}xs\right)^2 \left(\; 9\; f^4 \left(\frac{d}{drs}f\right)^2 \left(\frac{d}{dx2}rs\right)^2 \left(\frac{d}{dt}xs\right)^4 + 12\; f^3 \left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right)\left(\frac{d}{dt}xs\right)^2 + 12\right.$$

$$f^3 \left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 - 6\; f^2 \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\left(\frac{d}{dt}xs\right)^2 + 4\; f\left(\frac{d}{drs}f\right)$$

$$\left.\left(\frac{d^2}{dx2^2}rs\right) + 4\; f\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dx2}rs\right)^2 + \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2\;\right)\;\right) \Big/ \left(3\; f^2\left(\frac{d}{dt}xs\right)^2 + 1\right)^3$$

(%i47) `ratsimp(Jr);`

(%o47) $\left(\left[2\; f^2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\left(\frac{d}{dt}xs\right)^2 - 2\left(\frac{d}{drs}f\right)\left(\frac{d}{dx1}rs\right)\right]\left(\frac{d^2}{dt^2}xs\right) + \left(\; 6\; f^4\right.$

$$\left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx3}rs\right)^2 + 6\; f^4 \left(\frac{d}{drs}f\right)^2\left(\frac{d}{dx2}rs\right)^2 + 3\; f^5\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right) + 3\; f^5\left(\frac{d^2}{drs^2}f\right)$$

$$\left.\left(\frac{d}{dx1}rs\right)^2\;\right)\left(\frac{d}{dt}xs\right)^6 +$$

$$\left(\left[\left(6\; f^4\left(\frac{d^2}{drs^2}f\right) - 6\; f^3\left(\frac{d}{drs}f\right)^2\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right) + 6\; f^4\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\right]\left(\frac{d}{dt}xs\right)^5 + \Big(\right.$$

$$12\; f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(12\; f^3\left(\frac{d^2}{drs^2}f\right) - 4\; f^2\left(\frac{d}{drs}f\right)^2\right)\left(\frac{d}{dx3}rs\right)^2 + 12\; f^3\left(\frac{d}{drs}f\right)$$

$$\left(\frac{d^2}{dx2^2}rs\right) + \left(12\; f^3\left(\frac{d^2}{drs^2}f\right) - 4\; f^2\left(\frac{d}{drs}f\right)^2\right)\left(\frac{d}{dx2}rs\right)^2 - 2\; f^3\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right) +$$

$$\left.\left(f^2\left(\frac{d}{drs}f\right)^2 - 2\; f^3\left(\frac{d^2}{drs^2}f\right)\right)\left(\frac{d}{dx1}rs\right)^2\;\right)\left(\frac{d}{dt}xs\right)^4 +$$

$$\left(\left[\left(6\; f\left(\frac{d}{drs}f\right)^2 - 4\; f^2\left(\frac{d^2}{drs^2}f\right)\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right) - 4\; f^2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\right]\left(\frac{d}{dt}xs\right)^3 + \Big(\; 4\right.$$

$$f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx3^2}rs\right) + \left(4\; f\left(\frac{d^2}{drs^2}f\right) + 2\left(\frac{d}{drs}f\right)^2\right)\left(\frac{d}{dx3}rs\right)^2 + 4\; f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx2^2}rs\right) +$$

$$\left(4\; f\left(\frac{d^2}{drs^2}f\right) + 2\left(\frac{d}{drs}f\right)^2\right)\left(\frac{d}{dx2}rs\right)^2 - f\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dx1^2}rs\right) + \left(-f\left(\frac{d^2}{drs^2}f\right) - \left(\frac{d}{drs}f\right)^2\right)$$

$$\left.\left(\frac{d}{dx1}rs\right)^2\;\right)\left(\frac{d}{dt}xs\right)^2 + \left(-2\left(\frac{d^2}{drs^2}f\right)\left(\frac{d}{dt}rs\right)\left(\frac{d}{dx1}rs\right) - 2\left(\frac{d}{drs}f\right)\left(\frac{d^2}{dt\,dx1}rs\right)\right)\left(\frac{d}{dt}xs\right)\right) \Big/$$

$$\left(27\ f^6 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^6 + 27\ f^4 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^4 + 9\ f^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 1 \right)$$

(%i48) /* J[theta] */
        Jtheta : -(R2020 + R2121 + R2323);

(%o48) $\left(\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 \left(6\ f^3 \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x2^2}rs\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 6\ f^3 \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \right.\right.$

$\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 - 3\ f^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 2\ f \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x2^2}rs\right) + 2\ f \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)$

$\left.\left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 + \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \right)\right) / \left(3\ f^2\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 1 \right)^2 + \left(f \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 \left(3\ f^2 \right.\right.$

$\left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x2^2}rs\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 3\ f^2 \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 - 3\ f \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2$

$\left.\left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x2^2}rs\right) + \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \right)\right) / \left(3\ f^2\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 1 \right)^2$

(%i49) ratsimp(Jtheta);

(%o49) $\left(\left(9\ f^3 \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x2^2}rs\right) + \left(9\ f^3 \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right) - 6\ f^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2 \right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \right)\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^4 + \right.$

$\left. \left(3\ f\left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x2^2}rs\right) + \left(3\ f\left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right) + \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2 \right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x2}rs\right)^2 \right)\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 \right) / \left(9\ f^4 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^4 \right.$

$\left. + 6\ f^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 1 \right)$

(%i50) /* J[phi] */
        Jphi : -(R3030 + R3131 + R3232);

(%o50) $\left(\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 \left(6\ f^3 \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x3^2}rs\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 6\ f^3 \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x3}rs\right)^2 \right.\right.$

$\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 - 3\ f^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,x3}rs\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 2\ f \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x3^2}rs\right) + 2\ f \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)$

$\left.\left(\frac{\mathrm{d}}{\mathrm{d}\,x3}rs\right)^2 + \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,x3}rs\right)^2 \right)\right) / \left(3\ f^2\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 1 \right)^2 + \left(f \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 \left(3\ f^2 \right.\right.$

$\left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x3^2}rs\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 3\ f^2 \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x3}rs\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 - 3\ f \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)^2$

$\left.\left(\frac{\mathrm{d}}{\mathrm{d}\,x3}rs\right)^2 \left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + \left(\frac{\mathrm{d}}{\mathrm{d}\,rs}f\right)\left(\frac{\mathrm{d}^2}{\mathrm{d}\,x3^2}rs\right) + \left(\frac{\mathrm{d}^2}{\mathrm{d}\,rs^2}f\right)\left(\frac{\mathrm{d}}{\mathrm{d}\,x3}rs\right)^2 \right)\right) / \left(3\ f^2\left(\frac{\mathrm{d}}{\mathrm{d}\,t}xs\right)^2 + 1 \right)^2$

(%i51) ev(ratsimp(Jphi),r);

(%o51) $\left(\left(9\,f^3\left(\dfrac{d}{d\sqrt{xs^2-2\,x1\,xs+x3^2+x2^2+x1^2}}\,f\right)\left(\dfrac{d}{d\,t}xs\right)^4+3\,f\right.\right.$

$\left.\left(\dfrac{d}{d\sqrt{xs^2-2\,x1\,xs+x3^2+x2^2+x1^2}}\,f\right)\left(\dfrac{d}{d\,t}xs\right)^2\right)\left(\dfrac{d^2}{d\,x3^2}\sqrt{xs^2-2\,x1\,xs+x3^2+x2^2+x1^2}\right)+$

$\left(\left(9\,f^3\left(\dfrac{d^2}{d\,(xs^2-2\,x1\,xs+x3^2+x2^2+x1^2)}\,f\right)-6\,f^2\left(\dfrac{d}{d\sqrt{xs^2-2\,x1\,xs+x3^2+x2^2+x1^2}}\,f\right)^2\right)\right.$

$\left(\dfrac{d}{d\,t}xs\right)^4+\left(3\,f\left(\dfrac{d^2}{d\,(xs^2-2\,x1\,xs+x3^2+x2^2+x1^2)}\,f\right)+\left(\dfrac{d}{d\sqrt{xs^2-2\,x1\,xs+x3^2+x2^2+x1^2}}\,f\right)^2\right)$

$\left.\left(\dfrac{d}{d\,t}xs\right)^2\right)\left(\dfrac{d}{d\,x3}\sqrt{xs^2-2\,x1\,xs+x3^2+x2^2+x1^2}\right)^2\right)\;/\;\left(9\,f^4\left(\dfrac{d}{d\,t}xs\right)^4+6\,f^2\right.$

$\left.\left(\dfrac{d}{d\,t}xs\right)^2+1\right)$

(%i52)