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

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

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

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

(%i2) /* define coordinate vector */
```
        array(x, 3);
        [x[0],x[1],x[2],x[3]]: [t, r, theta, phi];
```

(%o2) x

(%o3) $[\,t\,,\,r\,,\,\theta\,,\,\varphi\,]$

(%i4) /* g1 is symm. metric with indices 1...4 */
```
        /* ********** Ciufolini - Wheeler (6.1.1)
        weak field, slow motion limit 2nd variant ********* */
        g1: matrix(
         [-(1-2*M/r),0,0,-4*J/r*sin(theta)^2],
         [0,(1-2*M/r)^-1,0,0],
         [0,0,r^2,0],
         [-4*J/r*sin(theta)^2,0,0,r^2*sin(theta)^2]
        );
```

(%o4)
$$\begin{bmatrix} \dfrac{2M}{r} - 1 & 0 & 0 & -\dfrac{4\sin(\theta)^2 J}{r} \\[2em] 0 & \dfrac{1}{1-\dfrac{2M}{r}} & 0 & 0 \\[2em] 0 & 0 & r^2 & 0 \\[2em] -\dfrac{4\sin(\theta)^2 J}{r} & 0 & 0 & r^2\sin(\theta)^2 \end{bmatrix}$$

(%i5) /* contravariant g is inverse of g */
```
        gContr1: ratsimp(invert(g1));
```

(%o5)

$$
\begin{bmatrix}
\dfrac{r^4}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4} & 0 & 0 & \dfrac{4\,r\,J}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4} \\[2em]
0 & -\dfrac{2\,M - r}{r} & 0 & 0 \\[2em]
0 & 0 & \dfrac{1}{r^2} & 0 \\[2em]
\dfrac{4\,r\,J}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4} & 0 & 0 & \dfrac{2\,r\,M - r^2}{2\,r^3\,\sin(\theta)^2\,M - 16\,\sin(\theta)^4\,J^2 - r^4\,\sin(\theta)^2}
\end{bmatrix}
$$

(%i6)
```
/* 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]
}}$
```

(%i7)
```
/* 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)
    }}}$
```

(%i8)
```
/* 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])
    }}}}$
```

$$
\Gamma_{0,0,1} = \frac{8\,\sin(\theta)^2\,J^2}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)} - \frac{r^2\,M}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4}
$$

$$
\Gamma_{0,0,2} = -\frac{16\,\cos(\theta)\,\sin(\theta)\,J^2}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4}
$$

$$
\Gamma_{0,1,0} = \frac{8\,\sin(\theta)^2\,J^2}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)} - \frac{r^2\,M}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4}
$$

$$\Gamma_{0,1,3} = \frac{6\,r^2\,\sin(\theta)^2\,J}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4}$$

$$\Gamma_{0,2,0} = -\frac{16\,\cos(\theta)\,\sin(\theta)\,J^2}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4}$$

$$\Gamma_{0,3,1} = \frac{6\,r^2\,\sin(\theta)^2\,J}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4}$$

$$\Gamma_{1,0,0} = -\frac{M\,(2\,M - r)}{r^3}$$

$$\Gamma_{1,0,3} = \frac{2\,\sin(\theta)^2\,J\,(2\,M - r)}{r^3}$$

$$\Gamma_{1,1,1} = \frac{M\,(2\,M - r)}{r^3\left(1 - \frac{2\,M}{r}\right)^2}$$

$$\Gamma_{1,2,2} = 2\,M - r$$

$$\Gamma_{1,3,0} = \frac{2\,\sin(\theta)^2\,J\,(2\,M - r)}{r^3}$$

$$\Gamma_{1,3,3} = \sin(\theta)^2\,(2\,M - r)$$

$$\Gamma_{2,0,3} = \frac{4\,\cos(\theta)\,\sin(\theta)\,J}{r^3}$$

$$\Gamma_{2,1,2} = \frac{1}{r}$$

$$\Gamma_{2,2,1} = \frac{1}{r}$$

$$\Gamma_{2,3,0} = \frac{4\,\cos(\theta)\,\sin(\theta)\,J}{r^3}$$

$$\Gamma_{2,3,3} = -\cos(\theta)\,\sin(\theta)$$

$$\Gamma_{3,0,1} = \frac{2\,\sin(\theta)^2\,J\,(2\,r\,M - r^2)}{r^2\,(2\,r^3\,\sin(\theta)^2\,M - 16\,\sin(\theta)^4\,J^2 - r^4\,\sin(\theta)^2)} - \frac{4\,J\,M}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$\Gamma_{3,0,2} = -\frac{4\,\cos(\theta)\,\sin(\theta)\,J\,(2\,r\,M - r^2)}{r\,(2\,r^3\,\sin(\theta)^2\,M - 16\,\sin(\theta)^4\,J^2 - r^4\,\sin(\theta)^2)}$$

$$\Gamma_{3,1,0} = \frac{2\,\sin(\theta)^2\,J\,(2\,r\,M - r^2)}{r^2\,(2\,r^3\,\sin(\theta)^2\,M - 16\,\sin(\theta)^4\,J^2 - r^4\,\sin(\theta)^2)} - \frac{4\,J\,M}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$\Gamma_{3,1,3} = \frac{r\,\sin(\theta)^2\,(2\,r\,M - r^2)}{2\,r^3\,\sin(\theta)^2\,M - 16\,\sin(\theta)^4\,J^2 - r^4\,\sin(\theta)^2} + \frac{8\,\sin(\theta)^2\,J^2}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$\Gamma_{3,2,0} = -\frac{4\,\cos(\theta)\,\sin(\theta)\,J\,(2\,r\,M - r^2)}{r\,(2\,r^3\,\sin(\theta)^2\,M - 16\,\sin(\theta)^4\,J^2 - r^4\,\sin(\theta)^2)}$$

$$\Gamma_{3,2,3} = \frac{r^2 \cos(\theta)\sin(\theta)(2\,r\,M - r^2)}{2\,r^3 \sin(\theta)^2 M - 16 \sin(\theta)^4 J^2 - r^4 \sin(\theta)^2} - \frac{16 \cos(\theta)\sin(\theta) J^2}{2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4}$$

$$\Gamma_{3,3,1} = \frac{r \sin(\theta)^2 (2\,r\,M - r^2)}{2\,r^3 \sin(\theta)^2 M - 16 \sin(\theta)^4 J^2 - r^4 \sin(\theta)^2} + \frac{8 \sin(\theta)^2 J^2}{r(2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4)}$$

$$\Gamma_{3,3,2} = \frac{r^2 \cos(\theta)\sin(\theta)(2\,r\,M - r^2)}{2\,r^3 \sin(\theta)^2 M - 16 \sin(\theta)^4 J^2 - r^4 \sin(\theta)^2} - \frac{16 \cos(\theta)\sin(\theta) J^2}{2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4}$$

(%i9)   /* 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)
}}}}$
```

(%i10) /* 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])
}}}}$
```

$$R_{0,0,0,3} = \frac{4 \sin(\theta)^2 J (2\,r^3 M^2 + 8 \sin(\theta)^2 J^2 M - r^4 M - 4\,r \sin(\theta)^2 J^2 - 16\,r \cos(\theta)^2 J^2)}{r^4 (2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4)}$$

$$R_{0,0,1,2} = \frac{24\,r^2 \cos(\theta)\sin(\theta) J^2 (2\,M - r)}{(2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4)^2}$$

$$R_{0,0,2,1} = -\frac{24\,r^2 \cos(\theta)\sin(\theta) J^2 (2\,M - r)}{(2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4)^2}$$

$$R_{0,0,3,0} = -\frac{4 \sin(\theta)^2 J (2\,r^3 M^2 + 8 \sin(\theta)^2 J^2 M - r^4 M - 4\,r \sin(\theta)^2 J^2 - 16\,r \cos(\theta)^2 J^2)}{r^4 (2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4)}$$

$$R_{0,1,0,1} = -\,(2\,(4\,r^6 M^3 - 64\,r^3 \sin(\theta)^2 J^2 M^2 - 4\,r^7 M^2 + 256 \sin(\theta)^4 J^4 M$$
$$+ 56\,r^4 \sin(\theta)^2 J^2 M + r^8 M - 96\,r \sin(\theta)^4 J^4 - 14\,r^5 \sin(\theta)^2 J^2))/(r^2$$
$$(2\,M - r)(2\,r^3 M - 16 \sin(\theta)^2 J^2 - r^4)^2)$$

$$R_{0,1,0,2} = -\frac{16\cos(\theta)\sin(\theta)J^2(3r^3M - 24\sin(\theta)^2J^2 - 2r^4)}{r(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,1,1,0} = (2(4r^6M^3 - 64r^3\sin(\theta)^2J^2M^2 - 4r^7M^2 + 256\sin(\theta)^4J^4M + 56r^4\sin(\theta)^2J^2M + r^8M - 96r\sin(\theta)^4J^4 - 14r^5\sin(\theta)^2J^2)) / (r^2(2M - r)(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2)$$

$$R_{0,1,1,3} = -\frac{6r\sin(\theta)^2J(4r^3M^2 + 16\sin(\theta)^2J^2M - 4r^4M - 16r\sin(\theta)^2J^2 + r^5)}{(2M - r)(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,1,2,0} = \frac{16\cos(\theta)\sin(\theta)J^2(3r^3M - 24\sin(\theta)^2J^2 - 2r^4)}{r(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,1,2,3} = \frac{12r^2\cos(\theta)\sin(\theta)J(2r^3M - 8\sin(\theta)^2J^2 - r^4)}{(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,1,3,1} = \frac{6r\sin(\theta)^2J(4r^3M^2 + 16\sin(\theta)^2J^2M - 4r^4M - 16r\sin(\theta)^2J^2 + r^5)}{(2M - r)(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,1,3,2} = -\frac{12r^2\cos(\theta)\sin(\theta)J(2r^3M - 8\sin(\theta)^2J^2 - r^4)}{(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,2,0,1} = -\frac{8\cos(\theta)\sin(\theta)J^2(12r^3M - 48\sin(\theta)^2J^2 - 7r^4)}{r(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,2,0,2} = -(4r^6M^3 - 64r^3\sin(\theta)^2J^2M^2 - 4r^7M^2 + 256\sin(\theta)^4J^4M + 80r^4\sin(\theta)^2J^2M - 32r^4\cos(\theta)^2J^2M + r^8M - 384r\sin(\theta)^4J^4 - 24r^5\sin(\theta)^2J^2 + 16r^5\cos(\theta)^2J^2) / (r(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2)$$

$$R_{0,2,1,0} = \frac{8\cos(\theta)\sin(\theta)J^2(12r^3M - 48\sin(\theta)^2J^2 - 7r^4)}{r(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2}$$

$$R_{0,2,1,3} = \frac{6r^2\cos(\theta)\sin(\theta)J}{2r^3M - 16\sin(\theta)^2J^2 - r^4}$$

$$R_{0,2,2,0} = (4r^6M^3 - 64r^3\sin(\theta)^2J^2M^2 - 4r^7M^2 + 256\sin(\theta)^4J^4M + 80r^4\sin(\theta)^2J^2M - 32r^4\cos(\theta)^2J^2M + r^8M - 384r\sin(\theta)^4J^4 - 24r^5\sin(\theta)^2J^2 + 16r^5\cos(\theta)^2J^2) / (r(2r^3M - 16\sin(\theta)^2J^2 - r^4)^2)$$

$$R_{0,2,2,3} = -\frac{6r^2\sin(\theta)^2J(2M - r)}{2r^3M - 16\sin(\theta)^2J^2 - r^4}$$

$$R_{0,2,3,1} = -\frac{6r^2\cos(\theta)\sin(\theta)J}{2r^3M - 16\sin(\theta)^2J^2 - r^4}$$

$$R_{0,2,3,2} = \frac{6\,r^2\,sin(\theta)^2\,J\,(2\,M - r)}{2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4}$$

$$R_{0,3,0,3} = -\frac{sin(\theta)^2\,(2\,r^3\,M^2 + 8\,sin(\theta)^2\,J^2\,M - r^4\,M - 4\,r\,sin(\theta)^2\,J^2 - 16\,r\,cos(\theta)^2\,J^2)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{0,3,1,2} = -\frac{6\,r^5\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{0,3,2,1} = \frac{6\,r^5\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{0,3,3,0} = \frac{sin(\theta)^2\,(2\,r^3\,M^2 + 8\,sin(\theta)^2\,J^2\,M - r^4\,M - 4\,r\,sin(\theta)^2\,J^2 - 16\,r\,cos(\theta)^2\,J^2)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,0,1} = -$$
$$\frac{2\,(4\,r^3\,M^3 - 32\,sin(\theta)^2\,J^2\,M^2 - 4\,r^4\,M^2 + 16\,r\,sin(\theta)^2\,J^2\,M + r^5\,M - 2\,r^2\,sin(\theta)^2\,J^2)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,0,2} = \frac{8\,cos(\theta)\,sin(\theta)\,J^2\,(2\,M - r)}{r^2\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,1,0} =$$
$$\frac{2\,(4\,r^3\,M^3 - 32\,sin(\theta)^2\,J^2\,M^2 - 4\,r^4\,M^2 + 16\,r\,sin(\theta)^2\,J^2\,M + r^5\,M - 2\,r^2\,sin(\theta)^2\,J^2)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,1,3} = -\frac{2\,sin(\theta)^2\,J\,(8\,r^3\,M^2 - 64\,sin(\theta)^2\,J^2\,M - 10\,r^4\,M + 24\,r\,sin(\theta)^2\,J^2 + 3\,r^5)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,2,0} = -\frac{8\,cos(\theta)\,sin(\theta)\,J^2\,(2\,M - r)}{r^2\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,2,3} = \frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r^3\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,3,1} = \frac{2\,sin(\theta)^2\,J\,(8\,r^3\,M^2 - 64\,sin(\theta)^2\,J^2\,M - 10\,r^4\,M + 24\,r\,sin(\theta)^2\,J^2 + 3\,r^5)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,0,3,2} = -\frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r^3\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)}$$

$$R_{1,2,0,3} = \frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)^2}{2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4}$$

$$R_{1,2,1,2} = -\frac{M}{r}$$

$$R_{1,2,2,1} = \frac{M}{r}$$

$$R_{1,2,3,0} = -\frac{6\cos(\theta)\sin(\theta)J(2M-r)^2}{2r^3M - 16\sin(\theta)^2J^2 - r^4}$$

$$R_{1,3,0,1} = \frac{2\sin(\theta)^2J(8r^3M^2 - 64\sin(\theta)^2J^2M - 10r^4M + 24r\sin(\theta)^2J^2 + 3r^5)}{r^4(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{1,3,0,2} = -\frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r^3}$$

$$R_{1,3,1,0} = -\frac{2\sin(\theta)^2J(8r^3M^2 - 64\sin(\theta)^2J^2M - 10r^4M + 24r\sin(\theta)^2J^2 + 3r^5)}{r^4(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{1,3,1,3} = -\frac{\sin(\theta)^2(2r^3M^2 + 56\sin(\theta)^2J^2M - r^4M - 36r\sin(\theta)^2J^2)}{r(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{1,3,2,0} = \frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r^3}$$

$$R_{1,3,3,1} = \frac{\sin(\theta)^2(2r^3M^2 + 56\sin(\theta)^2J^2M - r^4M - 36r\sin(\theta)^2J^2)}{r(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{2,0,0,1} = -\frac{8\cos(\theta)\sin(\theta)J^2}{r^3(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{2,0,0,2} = \frac{(2M-r)(2r^3M^2 - 16\sin(\theta)^2J^2M - r^4M - 16r\cos(\theta)^2J^2)}{r^4(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{2,0,1,0} = \frac{8\cos(\theta)\sin(\theta)J^2}{r^3(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{2,0,1,3} = -\frac{6\cos(\theta)\sin(\theta)J}{r^4}$$

$$R_{2,0,2,0} = -\frac{(2M-r)(2r^3M^2 - 16\sin(\theta)^2J^2M - r^4M - 16r\cos(\theta)^2J^2)}{r^4(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{2,0,2,3} = \frac{2\sin(\theta)^2J(2M-3r)}{r^4}$$

$$R_{2,0,3,1} = \frac{6\cos(\theta)\sin(\theta)J}{r^4}$$

$$R_{2,0,3,2} = -\frac{2\sin(\theta)^2J(2M-3r)}{r^4}$$

$$R_{2,1,0,3} = \frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r(2r^3M - 16\sin(\theta)^2J^2 - r^4)}$$

$$R_{2,1,1,2} = -\frac{M}{r^2(2M-r)}$$

$$R_{2,1,2,1} = \frac{M}{r^2(2M-r)}$$

$$R_{2,1,3,0} = -\frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r(2r^3M-16\sin(\theta)^2J^2-r^4)}$$

$$R_{2,3,0,1} = \frac{12\cos(\theta)\sin(\theta)J(2r^3M-8\sin(\theta)^2J^2-r^4)}{r^4(2r^3M-16\sin(\theta)^2J^2-r^4)}$$

$$R_{2,3,0,2} = -\frac{2\sin(\theta)^2J(2M-3r)}{r^4}$$

$$R_{2,3,1,0} = -\frac{12\cos(\theta)\sin(\theta)J(2r^3M-8\sin(\theta)^2J^2-r^4)}{r^4(2r^3M-16\sin(\theta)^2J^2-r^4)}$$

$$R_{2,3,2,0} = \frac{2\sin(\theta)^2J(2M-3r)}{r^4}$$

$$R_{2,3,2,3} = \frac{2\sin(\theta)^2M}{r}$$

$$R_{2,3,3,2} = -\frac{2\sin(\theta)^2M}{r}$$

$$R_{3,0,0,3} = \frac{(2M-r)(2r^3M^2+8\sin(\theta)^2J^2M-r^4M-4r\sin(\theta)^2J^2-16r\cos(\theta)^2J^2)}{r^4(2r^3M-16\sin(\theta)^2J^2-r^4)}$$

$$R_{3,0,1,2} = \frac{6r^2\cos(\theta)J(2M-r)^2}{\sin(\theta)(2r^3M-16\sin(\theta)^2J^2-r^4)^2}$$

$$R_{3,0,2,1} = -\frac{6r^2\cos(\theta)J(2M-r)^2}{\sin(\theta)(2r^3M-16\sin(\theta)^2J^2-r^4)^2}$$

$$R_{3,0,3,0} = -\frac{(2M-r)(2r^3M^2+8\sin(\theta)^2J^2M-r^4M-4r\sin(\theta)^2J^2-16r\cos(\theta)^2J^2)}{r^4(2r^3M-16\sin(\theta)^2J^2-r^4)}$$

$$R_{3,1,0,1} = -\frac{2J(12r^3M^2-48\sin(\theta)^2J^2M-12r^4M+16r\sin(\theta)^2J^2+3r^5)}{r(2M-r)(2r^3M-16\sin(\theta)^2J^2-r^4)^2}$$

$$R_{3,1,0,2} = -\frac{2\cos(\theta)J(12r^3M^2-96\sin(\theta)^2J^2M-12r^4M+32r\sin(\theta)^2J^2+3r^5)}{r\sin(\theta)(2r^3M-16\sin(\theta)^2J^2-r^4)^2}$$

$$R_{3,1,1,0} = \frac{2J(12r^3M^2-48\sin(\theta)^2J^2M-12r^4M+16r\sin(\theta)^2J^2+3r^5)}{r(2M-r)(2r^3M-16\sin(\theta)^2J^2-r^4)^2}$$

$$R_{3,1,1,3} = -(4r^6M^3+176r^3\sin(\theta)^2J^2M^2-4r^7M^2-512\sin(\theta)^4J^4M-208r^4\sin(\theta)^2J^2M+r^8M+192r\sin(\theta)^4J^4+60r^5\sin(\theta)^2J^2)/(r^2(2M-r)(2r^3M-16\sin(\theta)^2J^2-r^4)^2)$$

$$R_{3,1,2,0} = \frac{2\cos(\theta)J(12\,r^3\,M^2 - 96\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 32\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,1,2,3} = \frac{48\cos(\theta)\sin(\theta)J^2(2\,r^3\,M - 8\,\sin(\theta)^2\,J^2 - r^4)}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,1,3,1} = (\,4\,r^6\,M^3 + 176\,r^3\,\sin(\theta)^2\,J^2\,M^2 - 4\,r^7\,M^2 - 512\,\sin(\theta)^4\,J^4\,M - 208\,r^4\,\sin(\theta)^2\,J^2\,M + r^8\,M + 192\,r\,\sin(\theta)^4\,J^4 + 60\,r^5\,\sin(\theta)^2\,J^2\,)\,/\,(\,r^2\,(2\,M - r)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2\,)$$

$$R_{3,1,3,2} = -\frac{48\cos(\theta)\sin(\theta)J^2(2\,r^3\,M - 8\,\sin(\theta)^2\,J^2 - r^4)}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,2,0,1} = -\frac{4\cos(\theta)J(12\,r^3\,M^2 - 48\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,2,0,2} = -\frac{2\,J(2\,M - r)(6\,r^3\,M - 48\,\sin(\theta)^2\,J^2 - 32\,\cos(\theta)^2\,J^2 - 3\,r^4)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,2,1,0} = \frac{4\cos(\theta)J(12\,r^3\,M^2 - 48\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,2,1,3} = \frac{24\cos(\theta)\sin(\theta)J^2}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$R_{3,2,2,0} = \frac{2\,J(2\,M - r)(6\,r^3\,M - 48\,\sin(\theta)^2\,J^2 - 32\,\cos(\theta)^2\,J^2 - 3\,r^4)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,2,2,3} = -\frac{2(2\,r^3\,M^2 + 8\,\sin(\theta)^2\,J^2\,M - r^4\,M - 12\,r\,\sin(\theta)^2\,J^2)}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$R_{3,2,3,1} = -\frac{24\cos(\theta)\sin(\theta)J^2}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$R_{3,2,3,2} = \frac{2(2\,r^3\,M^2 + 8\,\sin(\theta)^2\,J^2\,M - r^4\,M - 12\,r\,\sin(\theta)^2\,J^2)}{r(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$R_{3,3,0,3} = -\frac{4\sin(\theta)^2\,J(2\,r^3\,M^2 + 8\,\sin(\theta)^2\,J^2\,M - r^4\,M - 4\,r\,\sin(\theta)^2\,J^2 - 16\,r\,\cos(\theta)^2\,J^2)}{r^4(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$R_{3,3,1,2} = -\frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,3,2,1} = \frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$R_{3,3,3,0} = \frac{4\,\sin(\theta)^2\,J\,(2\,r^3\,M^2 + 8\,\sin(\theta)^2\,J^2\,M - r^4\,M - 4\,r\,\sin(\theta)^2\,J^2 - 16\,r\,\cos(\theta)^2\,J^2)}{r^4\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

```
(%i11)  /* 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)
        }}$
```

```
(%i12)  /* 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])
            }}$
```

$$Ric_{0,0} = -\frac{8\,J^2\,(6\,\sin(\theta)^2\,M^2 - 4\,r\,\sin(\theta)^2\,M - 8\,r\,\cos(\theta)^2\,M + r^2\,\sin(\theta)^2 + 4\,r^2\,\cos(\theta)^2)}{r^4\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$Ric_{0,3} = \frac{32\,\sin(\theta)^2\,J^3\,(3\,\sin(\theta)^2\,M + r\,\sin(\theta)^2 - 2\,r\,\cos(\theta)^2)}{r^4\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$Ric_{1,1} = \frac{8\,\sin(\theta)^2\,J^2\,(30\,r^3\,M^2 - 96\,\sin(\theta)^2\,J^2\,M - 36\,r^4\,M + 48\,r\,\sin(\theta)^2\,J^2 + 11\,r^5)}{r^2\,(2\,M - r)\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$Ric_{1,2} = -\frac{16\,\cos(\theta)\,\sin(\theta)\,J^2\,(9\,r^3\,M - 48\,\sin(\theta)^2\,J^2 - 5\,r^4)}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$Ric_{2,1} = -\frac{16\,\cos(\theta)\,\sin(\theta)\,J^2\,(9\,r^3\,M - 48\,\sin(\theta)^2\,J^2 - 5\,r^4)}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

$$Ric_{2,2} = (16\,J^2\,(6\,r^3\,\sin(\theta)^2\,M^2 - 48\,\sin(\theta)^4\,J^2\,M - 9\,r^4\,\sin(\theta)^2\,M + 2\,r^4\,\cos(\theta)^2\,M + 48\,r\,\sin(\theta)^4\,J^2 + 3\,r^5\,\sin(\theta)^2 - r^5\,\cos(\theta)^2)) / (r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2)$$

$$Ric_{3,0} = \frac{32\,\sin(\theta)^2\,J^3\,(3\,\sin(\theta)^2\,M + r\,\sin(\theta)^2 - 2\,r\,\cos(\theta)^2)}{r^4\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

$$Ric_{3,3} = -\frac{8\,\sin(\theta)^2\,J^2\,(12\,\sin(\theta)^2\,M - 5\,r\,\sin(\theta)^2 - 2\,r\,\cos(\theta)^2)}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)}$$

```
(%i13)  /* 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)
        ;
```

(%o13) $(16\ J^2\ (6\ r^3\ sin(\theta)^2\ M^2 - 48\ sin(\theta)^4\ J^2\ M - 9\ r^4\ sin(\theta)^2\ M + 2\ r^4$

$cos(\theta)^2\ M + 48\ r\ sin(\theta)^4\ J^2 + 3\ r^5\ sin(\theta)^2 - r^5\ cos(\theta)^2\ )) / (r^3$

$(2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)^2\ ) -$

$$\frac{8\ J^2\ (6\ sin(\theta)^2\ M^2 - 4\ r\ sin(\theta)^2\ M - 8\ r\ cos(\theta)^2\ M + r^2\ sin(\theta)^2 + 4\ r^2\ cos(\theta)^2)}{(2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)^2} -$$

$$\frac{8\ sin(\theta)^2\ J^2\ (30\ r^3\ M^2 - 96\ sin(\theta)^2\ J^2\ M - 36\ r^4\ M + 48\ r\ sin(\theta)^2\ J^2 + 11\ r^5)}{r^3\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)^2} -$$

$$\frac{8\ sin(\theta)^2\ J^2\ (2\ r\ M - r^2)(12\ sin(\theta)^2\ M - 5\ r\ sin(\theta)^2 - 2\ r\ cos(\theta)^2)}{r(2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)(2\ r^3\ sin(\theta)^2\ M - 16\ sin(\theta)^4\ J^2 - r^4\ sin(\theta)^2)} +$$

$$\frac{256\ sin(\theta)^2\ J^4\ (3\ sin(\theta)^2\ M + r\ sin(\theta)^2 - 2\ r\ cos(\theta)^2)}{r^3\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)^2}$$

(%i14) ratsimp(RicSc);

(%o14) $- (384\ r^3\ sin(\theta)^2\ J^2\ M^2 +$

$((- 352\ r^4\ sin(\theta)^2 - 128\ r^4\ cos(\theta)^2)J^2 - 768\ sin(\theta)^4\ J^4)\ M +$

$(512\ r\ cos(\theta)^2\ sin(\theta)^2 - 640\ r\ sin(\theta)^4)\ J^4 + (88\ r^5\ sin(\theta)^2 + 64\ r^5\ cos(\theta)^2)\ J^2\ ) / ($

$4\ r^9\ M^2 + (- 64\ r^6\ sin(\theta)^2\ J^2 - 4\ r^{10})\ M + 256\ r^3\ sin(\theta)^4\ J^4 + 32\ r^7\ sin(\theta)^2\ J^2 +$

$r^{11}\ )$

(%i15)
```
/* 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!

$\mu = 0$

$\sigma = 0$

$\nu = 1$

$\rho = 2$

$$R\_q = -\frac{8\cos(\theta)\sin(\theta)J^2(12\,r^3\,M - 48\sin(\theta)^2\,J^2 - 7\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} +$$

$$\frac{16\cos(\theta)\sin(\theta)J^2(3\,r^3\,M - 24\sin(\theta)^2\,J^2 - 2\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} + \frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2}$$

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

μ = 0

σ = 0

ν = 2

ρ = 1

$$R\_q = \frac{8\cos(\theta)\sin(\theta)J^2(12\,r^3\,M - 48\sin(\theta)^2\,J^2 - 7\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{16\cos(\theta)\sin(\theta)J^2(3\,r^3\,M - 24\sin(\theta)^2\,J^2 - 2\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} - \frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2}$$

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

μ = 0

σ = 1

ν = 0

ρ = 2

$$R\_q = \frac{8\cos(\theta)\sin(\theta)J^2(12\,r^3\,M - 48\sin(\theta)^2\,J^2 - 7\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{16\cos(\theta)\sin(\theta)J^2(3\,r^3\,M - 24\sin(\theta)^2\,J^2 - 2\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} - \frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2}$$

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

μ = 0

σ = 1

ν = 2

ρ = 0

$$R\_q = -\frac{8\cos(\theta)\sin(\theta)J^2(12\,r^3\,M - 48\sin(\theta)^2\,J^2 - 7\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} +$$

$$\frac{16\cos(\theta)\sin(\theta)J^2(3\,r^3\,M - 24\sin(\theta)^2\,J^2 - 2\,r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} + \frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

$\mu = 0$

$\sigma = 1$

$\nu = 2$

$\rho = 3$

$$R\_q = \frac{12\,r^2\,cos(\theta)\,sin(\theta)\,J\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} - \frac{6\,r^2\,cos(\theta)\,sin(\theta)\,J}{2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4} -$$

$$\frac{6\,r^5\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

$\mu = 0$

$\sigma = 1$

$\nu = 3$

$\rho = 2$

$$R\_q = -\frac{12\,r^2\,cos(\theta)\,sin(\theta)\,J\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} + \frac{6\,r^2\,cos(\theta)\,sin(\theta)\,J}{2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4} +$$

$$\frac{6\,r^5\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

$\mu = 0$

$\sigma = 2$

$\nu = 0$

$\rho = 1$

$$R\_q = -\frac{8\,cos(\theta)\,sin(\theta)\,J^2\,(12\,r^3\,M - 48\,sin(\theta)^2\,J^2 - 7\,r^4)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} +$$

$$\frac{16\,cos(\theta)\,sin(\theta)\,J^2\,(3\,r^3\,M - 24\,sin(\theta)^2\,J^2 - 2\,r^4)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} + \frac{24\,r^2\,cos(\theta)\,sin(\theta)\,J^2\,(2\,M - r)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

$\mu = 0$

$\sigma = 2$

$\nu = 1$

$\rho = 0$

$$R\_q = \frac{8\,\cos(\theta)\,\sin(\theta)\,J^2\,(12\,r^3\,M - 48\,\sin(\theta)^2\,J^2 - 7\,r^4)}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} - $$

$$\frac{16\,\cos(\theta)\,\sin(\theta)\,J^2\,(3\,r^3\,M - 24\,\sin(\theta)^2\,J^2 - 2\,r^4)}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} - \frac{24\,r^2\,\cos(\theta)\,\sin(\theta)\,J^2\,(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

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

$\mu = 0$

$\sigma = 2$

$\nu = 1$

$\rho = 3$

$$R\_q = -\frac{12\,r^2\,\cos(\theta)\,\sin(\theta)\,J\,(2\,r^3\,M - 8\,\sin(\theta)^2\,J^2 - r^4)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} + \frac{6\,r^2\,\cos(\theta)\,\sin(\theta)\,J}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4} + $$

$$\frac{6\,r^5\,\cos(\theta)\,\sin(\theta)\,J\,(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

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

$\mu = 0$

$\sigma = 2$

$\nu = 3$

$\rho = 1$

$$R\_q = \frac{12\,r^2\,\cos(\theta)\,\sin(\theta)\,J\,(2\,r^3\,M - 8\,\sin(\theta)^2\,J^2 - r^4)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} - \frac{6\,r^2\,\cos(\theta)\,\sin(\theta)\,J}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4} - $$

$$\frac{6\,r^5\,\cos(\theta)\,\sin(\theta)\,J\,(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

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

$\mu = 0$

$\sigma = 3$

$\nu = 1$

$\rho = 2$

$$R\_q = \frac{12\,r^2\,\cos(\theta)\,\sin(\theta)\,J\,(2\,r^3\,M - 8\,\sin(\theta)^2\,J^2 - r^4)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} - \frac{6\,r^2\,\cos(\theta)\,\sin(\theta)\,J}{2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4} - $$

$$\frac{6\,r^5\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)}{(2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4)^2}$$

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

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

μ = 0

σ = 3

ν = 2

ρ = 1

$$R\_q\,=\,-\,\frac{12\,r^2\,cos(\theta)\,sin(\theta)\,J\,(2\,r^3\,M\,-\,8\,sin(\theta)^2\,J^2\,-\,r^4)}{(2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4)^2}\,+\,\frac{6\,r^2\,cos(\theta)\,sin(\theta)\,J}{2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4}\,+$$

$$\frac{6\,r^5\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)}{(2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4)^2}$$

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

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

μ = 1

σ = 0

ν = 2

ρ = 3

$$R\_q\,=\,\frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)\,(2\,r^3\,M\,-\,8\,sin(\theta)^2\,J^2\,-\,r^4)}{r^3\,(2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4)}\,-\,\frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)^2}{2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4}\,-$$

$$\frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)}{r^3}$$

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

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

μ = 1

σ = 0

ν = 3

ρ = 2

$$R\_q\,=\,-\,\frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)\,(2\,r^3\,M\,-\,8\,sin(\theta)^2\,J^2\,-\,r^4)}{r^3\,(2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4)}\,+\,\frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)^2}{2\,r^3\,M\,-\,16\,sin(\theta)^2\,J^2\,-\,r^4}\,+$$

$$\frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M\,-\,r)}{r^3}$$

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

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

μ = 1

σ = 2

ν = 0

ρ = 3

$$R\_q = -\frac{12\cos(\theta)\sin(\theta)J(2M-r)(2r^3M-8\sin(\theta)^2J^2-r^4)}{r^3(2r^3M-16\sin(\theta)^2J^2-r^4)} + \frac{6\cos(\theta)\sin(\theta)J(2M-r)^2}{2r^3M-16\sin(\theta)^2J^2-r^4} +$$

$$\frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r^3}$$

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

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

μ = 1

σ = 2

ν = 3

ρ = 0

$$R\_q = \frac{12\cos(\theta)\sin(\theta)J(2M-r)(2r^3M-8\sin(\theta)^2J^2-r^4)}{r^3(2r^3M-16\sin(\theta)^2J^2-r^4)} - \frac{6\cos(\theta)\sin(\theta)J(2M-r)^2}{2r^3M-16\sin(\theta)^2J^2-r^4} -$$

$$\frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r^3}$$

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

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

μ = 1

σ = 3

ν = 0

ρ = 2

$$R\_q = \frac{12\cos(\theta)\sin(\theta)J(2M-r)(2r^3M-8\sin(\theta)^2J^2-r^4)}{r^3(2r^3M-16\sin(\theta)^2J^2-r^4)} - \frac{6\cos(\theta)\sin(\theta)J(2M-r)^2}{2r^3M-16\sin(\theta)^2J^2-r^4} -$$

$$\frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r^3}$$

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

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

μ = 1

σ = 3

ν = 2

ρ = 0

$$R\_q = -\frac{12\cos(\theta)\sin(\theta)J(2M-r)(2r^3M-8\sin(\theta)^2J^2-r^4)}{r^3(2r^3M-16\sin(\theta)^2J^2-r^4)} + \frac{6\cos(\theta)\sin(\theta)J(2M-r)^2}{2r^3M-16\sin(\theta)^2J^2-r^4} +$$

$$\frac{6\cos(\theta)\sin(\theta)J(2M-r)}{r^3}$$

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

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

μ = 2

σ = 0

ν = 1

ρ = 3

$$R\_q = \frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} - \frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} -$$

$$\frac{6\,cos(\theta)\,sin(\theta)\,J}{r^4}$$

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

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

μ = 2

σ = 0

ν = 3

ρ = 1

$$R\_q = -\frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} + \frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} +$$

$$\frac{6\,cos(\theta)\,sin(\theta)\,J}{r^4}$$

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

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

μ = 2

σ = 1

ν = 0

ρ = 3

$$R\_q = -\frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} + \frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} +$$

$$\frac{6\,cos(\theta)\,sin(\theta)\,J}{r^4}$$

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

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μ = 2

σ = 1

ν = 3

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$$R\_q = \frac{12\,cos(\theta)\,sin(\theta)\,J\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r^4\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} - \frac{6\,cos(\theta)\,sin(\theta)\,J\,(2\,M - r)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} -$$

$$\frac{6\ cos(\theta)\ sin(\theta)\ J}{r^4}$$

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

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

μ = 2

σ = 3

ν = 0

ρ = 1

$$R\_q = \frac{12\ cos(\theta)\ sin(\theta)\ J\ (2\ r^3\ M - 8\ sin(\theta)^2\ J^2 - r^4)}{r^4\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)} - \frac{6\ cos(\theta)\ sin(\theta)\ J\ (2\ M - r)}{r\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)} -$$

$$\frac{6\ cos(\theta)\ sin(\theta)\ J}{r^4}$$

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μ = 2

σ = 3

ν = 1

ρ = 0

$$R\_q = -\frac{12\ cos(\theta)\ sin(\theta)\ J\ (2\ r^3\ M - 8\ sin(\theta)^2\ J^2 - r^4)}{r^4\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)} + \frac{6\ cos(\theta)\ sin(\theta)\ J\ (2\ M - r)}{r\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)} +$$

$$\frac{6\ cos(\theta)\ sin(\theta)\ J}{r^4}$$

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

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

μ = 3

σ = 0

ν = 1

ρ = 2

$$R\_q = -\frac{4\ cos(\theta)\ J\ (12\ r^3\ M^2 - 48\ sin(\theta)^2\ J^2\ M - 12\ r^4\ M + 16\ r\ sin(\theta)^2\ J^2 + 3\ r^5)}{r\ sin(\theta)\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)^2} +$$

$$\frac{2\ cos(\theta)\ J\ (12\ r^3\ M^2 - 96\ sin(\theta)^2\ J^2\ M - 12\ r^4\ M + 32\ r\ sin(\theta)^2\ J^2 + 3\ r^5)}{r\ sin(\theta)\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)^2} +$$

$$\frac{6\ r^2\ cos(\theta)\ J\ (2\ M - r)^2}{sin(\theta)\ (2\ r^3\ M - 16\ sin(\theta)^2\ J^2 - r^4)^2}$$

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

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

μ = 3

σ = 0

ν = 2

ρ = 1

$$R\_q = \frac{4\cos(\theta)J(12\,r^3\,M^2 - 48\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{2\cos(\theta)J(12\,r^3\,M^2 - 96\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 32\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{6\,r^2\,\cos(\theta)J(2\,M - r)^2}{\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 1

ν = 0

ρ = 2

$$R\_q = \frac{4\cos(\theta)J(12\,r^3\,M^2 - 48\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{2\cos(\theta)J(12\,r^3\,M^2 - 96\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 32\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{6\,r^2\,\cos(\theta)J(2\,M - r)^2}{\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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μ = 3

σ = 1

ν = 2

ρ = 0

$$R\_q = -\frac{4\cos(\theta)J(12\,r^3\,M^2 - 48\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} +$$

$$\frac{2\cos(\theta)J(12\,r^3\,M^2 - 96\,\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 32\,r\,\sin(\theta)^2\,J^2 + 3\,r^5)}{r\,\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} +$$

$$\frac{6\,r^2\,\cos(\theta)J(2\,M - r)^2}{\sin(\theta)(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 1

ν = 2

ρ = 3

$$R\_q = \frac{48\,cos(\theta)\,sin(\theta)\,J^2\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} - \frac{24\,cos(\theta)\,sin(\theta)\,J^2}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} -$$

$$\frac{24\,r^2\,cos(\theta)\,sin(\theta)\,J^2\,(2\,M - r)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 1

ν = 3

ρ = 2

$$R\_q = -\frac{48\,cos(\theta)\,sin(\theta)\,J^2\,(2\,r^3\,M - 8\,sin(\theta)^2\,J^2 - r^4)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} + \frac{24\,cos(\theta)\,sin(\theta)\,J^2}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)} +$$

$$\frac{24\,r^2\,cos(\theta)\,sin(\theta)\,J^2\,(2\,M - r)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 2

ν = 0

ρ = 1

$$R\_q = -\frac{4\,cos(\theta)\,J\,(12\,r^3\,M^2 - 48\,sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\,sin(\theta)^2\,J^2 + 3\,r^5)}{r\,sin(\theta)\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} +$$

$$\frac{2\,cos(\theta)\,J\,(12\,r^3\,M^2 - 96\,sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 32\,r\,sin(\theta)^2\,J^2 + 3\,r^5)}{r\,sin(\theta)\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2} +$$

$$\frac{6\,r^2\,cos(\theta)\,J\,(2\,M - r)^2}{sin(\theta)\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 2

ν = 1

ρ = 0

$$R\_q = \frac{4\cos(\theta)J(12\,r^3\,M^2 - 48\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\sin(\theta)^2\,J^2 + 3\,r^5)}{r\sin(\theta)(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{2\cos(\theta)J(12\,r^3\,M^2 - 96\sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 32\,r\sin(\theta)^2\,J^2 + 3\,r^5)}{r\sin(\theta)(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} -$$

$$\frac{6\,r^2\cos(\theta)J(2\,M - r)^2}{\sin(\theta)(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 2

ν = 1

ρ = 3

$$R\_q = -\frac{48\cos(\theta)\sin(\theta)J^2(2\,r^3\,M - 8\sin(\theta)^2\,J^2 - r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} + \frac{24\cos(\theta)\sin(\theta)J^2}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)} +$$

$$\frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 2

ν = 3

ρ = 1

$$R\_q = \frac{48\cos(\theta)\sin(\theta)J^2(2\,r^3\,M - 8\sin(\theta)^2\,J^2 - r^4)}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2} - \frac{24\cos(\theta)\sin(\theta)J^2}{r(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)} -$$

$$\frac{24\,r^2\cos(\theta)\sin(\theta)J^2(2\,M - r)}{(2\,r^3\,M - 16\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 3

ν = 1

ρ = 2

$$R\_q = \frac{48\,\cos(\theta)\,\sin(\theta)\,J^2\,(2\,r^3\,M - 8\,\sin(\theta)^2\,J^2 - r^4)}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} - \frac{24\,\cos(\theta)\,\sin(\theta)\,J^2}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)} -$$

$$\frac{24\,r^2\,\cos(\theta)\,\sin(\theta)\,J^2\,(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

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

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

μ = 3

σ = 3

ν = 2

ρ = 1

$$R\_q = - \frac{48\,\cos(\theta)\,\sin(\theta)\,J^2\,(2\,r^3\,M - 8\,\sin(\theta)^2\,J^2 - r^4)}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} + \frac{24\,\cos(\theta)\,\sin(\theta)\,J^2}{r\,(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)} +$$

$$\frac{24\,r^2\,\cos(\theta)\,\sin(\theta)\,J^2\,(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2}$$

(%o15)   *done*

(%i16) /* 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);

(%o16) $(2\,r\,(4\,r^6\,M^3 - 64\,r^3\,\sin(\theta)^2\,J^2\,M^2 - 4\,r^7\,M^2 + 256\,\sin(\theta)^4\,J^4\,M +$

$56\,r^4\,\sin(\theta)^2\,J^2\,M + r^8\,M - 96\,r\,\sin(\theta)^4\,J^4 - 14\,r^5\,\sin(\theta)^2\,J^2)) /$

$(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^3 -$

$\dfrac{24\,r\,\sin(\theta)^2\,J^2\,(4\,r^3\,M^2 + 16\,\sin(\theta)^2\,J^2\,M - 4\,r^4\,M - 16\,r\,\sin(\theta)^2\,J^2 + r^5)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^3}$

(%o17) $\dfrac{24\,r\,\sin(\theta)^2\,J^2\,(2\,M - r)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^2} - (r\,(4\,r^6\,M^3 - 64\,r^3\,\sin(\theta)^2\,J^2\,M^2 - 4\,r^7$

$M^2 + 256\,\sin(\theta)^4\,J^4\,M + 80\,r^4\,\sin(\theta)^2\,J^2\,M - 32\,r^4\,\cos(\theta)^2\,J^2\,M + r^8\,M - 384$

$r\,\sin(\theta)^4\,J^4 - 24\,r^5\,\sin(\theta)^2\,J^2 + 16\,r^5\,\cos(\theta)^2\,J^2)) /$

$(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^3$

(%o18) $\dfrac{16\,r\,\sin(\theta)^2\,J^2\,(2\,r^3\,M^2 + 8\,\sin(\theta)^2\,J^2\,M - r^4\,M - 4\,r\,\sin(\theta)^2\,J^2 - 16\,r\,\cos(\theta)^2\,J^2)}{(2\,r^3\,M - 16\,\sin(\theta)^2\,J^2 - r^4)^3} -$

$$\frac{r^3 \sin(\theta)^2 (2 r M - r^2)(2 r^3 M^2 + 8 \sin(\theta)^2 J^2 M - r^4 M - 4 r \sin(\theta)^2 J^2 - 16 r \cos(\theta)^2 J^2)}{(2 r^3 M - 16 \sin(\theta)^2 J^2 - r^4)^2 (2 r^3 \sin(\theta)^2 M - 16 \sin(\theta)^4 J^2 - r^4 \sin(\theta)^2)}$$

(%i19) R0101: factor(R0101);
        R0202: factor(R0202);
        R0303: factor(R0303);

(%o19) $(2 \, r \, (4 \, r^6 \, M^3 - 112 \, r^3 \, \sin(\theta)^2 \, J^2 \, M^2 - 4 \, r^7 \, M^2 + 64 \, \sin(\theta)^4 \, J^4 \, M +$

$104 \, r^4 \, \sin(\theta)^2 \, J^2 \, M + r^8 \, M + 96 \, r \, \sin(\theta)^4 \, J^4 - 26 \, r^5 \, \sin(\theta)^2 \, J^2)) /$

$(2 \, r^3 \, M - 16 \, \sin(\theta)^2 \, J^2 - r^4)^3$

(%o20) $- (r \, (4 \, r^6 \, M^3 - 160 \, r^3 \, \sin(\theta)^2 \, J^2 \, M^2 - 4 \, r^7 \, M^2 + 1024 \, \sin(\theta)^4 \, J^4 \, M +$

$176 \, r^4 \, \sin(\theta)^2 \, J^2 \, M - 32 \, r^4 \, \cos(\theta)^2 \, J^2 \, M + r^8 \, M - 768 \, r \, \sin(\theta)^4 \, J^4 - 48 \, r^5$

$\sin(\theta)^2 \, J^2 + 16 \, r^5 \, \cos(\theta)^2 \, J^2)) / (2 \, r^3 \, M - 16 \, \sin(\theta)^2 \, J^2 - r^4)^3$

(%o21) $- \dfrac{r(2 \, r^3 \, M^2 + 8 \, \sin(\theta)^2 \, J^2 \, M - r^4 \, M - 4 \, r \sin(\theta)^2 \, J^2 - 16 \, r \cos(\theta)^2 \, J^2)}{(2 \, r^3 \, M - 16 \, \sin(\theta)^2 \, J^2 - r^4)^2}$

(%i22) R1010: f(1,0);
        R1212: f(1,2);
        R1313: f(1,3);

(%o22) $\dfrac{8 \sin(\theta)^2 \, J^2 (2 M - r)(8 \, r^3 \, M^2 - 64 \sin(\theta)^2 \, J^2 \, M - 10 \, r^4 \, M + 24 \, r \sin(\theta)^2 \, J^2 + 3 \, r^5)}{r^4 (2 \, r^3 \, M - 16 \sin(\theta)^2 \, J^2 - r^4)^2} -$

$\dfrac{2(2 M - r)(4 \, r^3 \, M^3 - 32 \sin(\theta)^2 \, J^2 \, M^2 - 4 \, r^4 \, M^2 + 16 \, r \sin(\theta)^2 \, J^2 \, M + r^5 \, M - 2 \, r^2 \sin(\theta)^2 \, J^2)}{r(2 \, r^3 \, M - 16 \sin(\theta)^2 \, J^2 - r^4)^2}$

(%o23) $\dfrac{M(2 M - r)}{r^4}$

(%o24) $\dfrac{8 \sin(\theta)^2 \, J^2 (2 M - r)(8 \, r^3 \, M^2 - 64 \sin(\theta)^2 \, J^2 \, M - 10 \, r^4 \, M + 24 \, r \sin(\theta)^2 \, J^2 + 3 \, r^5)}{r^4 (2 \, r^3 \, M - 16 \sin(\theta)^2 \, J^2 - r^4)^2} +$

$\dfrac{\sin(\theta)^2 (2 M - r)(2 r M - r^2)(2 \, r^3 \, M^2 + 56 \sin(\theta)^2 \, J^2 \, M - r^4 \, M - 36 \, r \sin(\theta)^2 \, J^2)}{r^2 (2 \, r^3 \, M - 16 \sin(\theta)^2 \, J^2 - r^4)(2 \, r^3 \sin(\theta)^2 \, M - 16 \sin(\theta)^4 \, J^2 - r^4 \sin(\theta)^2)}$

(%i25) R1010: factor(R1010);
        R1212: factor(R1212);
        R1313: factor(R1313);

(%o25) $- (2 (2 M - r) (4 \, r^6 \, M^3 - 64 \, r^3 \, \sin(\theta)^2 \, J^2 \, M^2 - 4 \, r^7 \, M^2 + 256 \, \sin(\theta)^4$

$J^4 \, M + 56 \, r^4 \, \sin(\theta)^2 \, J^2 \, M + r^8 \, M - 96 \, r \, \sin(\theta)^4 \, J^4 - 14 \, r^5 \, \sin(\theta)^2 \, J^2)) / ($

$r^4 \, (2 \, r^3 \, M - 16 \, \sin(\theta)^2 \, J^2 - r^4)^2)$

(%o26) $\dfrac{M(2\,M-r)}{r^4}$

(%o27) $(\,(2\,M-r)\,(\,4\,r^6\,M^3+176\,r^3\,sin(\theta)^2\,J^2\,M^2-4\,r^7\,M^2-512\,sin(\theta)^4\,J^4$
$M-208\,r^4\,sin(\theta)^2\,J^2\,M+r^8\,M+192\,r\,sin(\theta)^4\,J^4+60\,r^5\,sin(\theta)^2\,J^2\,)\,)\,/\,(\,r^4$
$(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)^2\,)$

(%i28) R2020: f(2,0);
       R2121: f(2,1);
       R2323: f(2,3);

(%o28) $\dfrac{8\,sin(\theta)^2\,J^2\,(2\,M-3\,r)}{r^5\,(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)}-$

$\dfrac{(2\,M-r)(2\,r^3\,M^2-16\,sin(\theta)^2\,J^2\,M-r^4\,M-16\,r\,cos(\theta)^2\,J^2)}{r^2\,(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)^2}$

(%o29) $-\dfrac{M}{r^5}$

(%o30) $\dfrac{2\,sin(\theta)^2\,M\,(2\,r\,M-r^2)}{r^3\,(2\,r^3\,sin(\theta)^2\,M-16\,sin(\theta)^4\,J^2-r^4\,sin(\theta)^2)}+\dfrac{8\,sin(\theta)^2\,J^2\,(2\,M-3\,r)}{r^5\,(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)}$

(%i31) R2020: factor(R2020);
       R2121: factor(R2121);
       R2323: factor(R2323);

(%o31) $-(\,4\,r^6\,M^3-64\,r^3\,sin(\theta)^2\,J^2\,M^2-4\,r^7\,M^2+256\,sin(\theta)^4\,J^4\,M+80\,r^4$
$sin(\theta)^2\,J^2\,M-32\,r^4\,cos(\theta)^2\,J^2\,M+r^8\,M-384\,r\,sin(\theta)^4\,J^4-24\,r^5\,sin(\theta)^2$
$J^2+16\,r^5\,cos(\theta)^2\,J^2\,)\,/\,(\,r^5\,(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)^2\,)$

(%o32) $-\dfrac{M}{r^5}$

(%o33) $\dfrac{2\,(2\,r^3\,M^2+8\,sin(\theta)^2\,J^2\,M-r^4\,M-12\,r\,sin(\theta)^2\,J^2)}{r^5\,(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)}$

(%i34) R3030: f(3,0);
       R3131: f(3,1);
       R3232: f(3,2);

(%o34) $\dfrac{16\,J^2\,(2\,M-r)(2\,r^3\,M^2+8\,sin(\theta)^2\,J^2\,M-r^4\,M-4\,r\,sin(\theta)^2\,J^2-16\,r\,cos(\theta)^2\,J^2)}{r^2\,(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)^3}-$

$\dfrac{(2\,M-r)(2\,r\,M-r^2)(2\,r^3\,M^2+8\,sin(\theta)^2\,J^2\,M-r^4\,M-4\,r\,sin(\theta)^2\,J^2-16\,r\,cos(\theta)^2\,J^2)}{(2\,r^3\,M-16\,sin(\theta)^2\,J^2-r^4)^2\,(2\,r^3\,sin(\theta)^2\,M-16\,sin(\theta)^4\,J^2-r^4\,sin(\theta)^2)}$

(%o35) $\dfrac{8\,J^2\,(12\,r^3\,M^2 - 48\,sin(\theta)^2\,J^2\,M - 12\,r^4\,M + 16\,r\,sin(\theta)^2\,J^2 + 3\,r^5)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^3} - ((2\,r\,M - r^2)\,($

$4\,r^6\,M^3 + 176\,r^3\,sin(\theta)^2\,J^2\,M^2 - 4\,r^7\,M^2 - 512\,sin(\theta)^4\,J^4\,M - 208\,r^4\,sin(\theta)^2$

$J^2\,M + r^8\,M + 192\,r\,sin(\theta)^4\,J^4 + 60\,r^5\,sin(\theta)^2\,J^2))\,/\,(r^3$

$(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2\,(2\,r^3\,sin(\theta)^2\,M - 16\,sin(\theta)^4\,J^2 - r^4\,sin(\theta)^2))$

(%o36) $\dfrac{2\,(2\,r\,M - r^2)(2\,r^3\,M^2 + 8\,sin(\theta)^2\,J^2\,M - r^4\,M - 12\,r\,sin(\theta)^2\,J^2)}{r^3\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)(2\,r^3\,sin(\theta)^2\,M - 16\,sin(\theta)^4\,J^2 - r^4\,sin(\theta)^2)} -$

$\dfrac{8\,J^2\,(2\,M - r)(6\,r^3\,M - 48\,sin(\theta)^2\,J^2 - 32\,cos(\theta)^2\,J^2 - 3\,r^4)}{r\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^3}$

(%i37) ```R3030: factor(R3030);```
```
       R3131: factor(R3131);
       R3232: factor(R3232);
```

(%o37) $-\dfrac{(2\,M - r)(2\,r^3\,M^2 + 8\,sin(\theta)^2\,J^2\,M - r^4\,M - 4\,r\,sin(\theta)^2\,J^2 - 16\,r\,cos(\theta)^2\,J^2)}{r^2\,sin(\theta)^2\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$

(%o38) $-(8\,r^6\,M^4 + 352\,r^3\,sin(\theta)^2\,J^2\,M^3 - 12\,r^7\,M^3 - 1024\,sin(\theta)^4\,J^4\,M^2 -$

$688\,r^4\,sin(\theta)^2\,J^2\,M^2 + 6\,r^8\,M^2 + 1280\,r\,sin(\theta)^4\,J^4\,M + 424\,r^5\,sin(\theta)^2\,J^2\,M -$

$r^9\,M - 320\,r^2\,sin(\theta)^4\,J^4 - 84\,r^6\,sin(\theta)^2\,J^2)\,/\,(r^2\,sin(\theta)^2$

$(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^3)$

(%o39) $(2\,(2\,M - r)\,(4\,r^6\,M^3 - 16\,r^3\,sin(\theta)^2\,J^2\,M^2 - 4\,r^7\,M^2 - 128\,sin(\theta)^4$

$J^4\,M - 40\,r^4\,sin(\theta)^2\,J^2\,M + r^8\,M + 384\,r\,sin(\theta)^4\,J^4 + 128\,r\,cos(\theta)^2\,sin(\theta)^2$

$J^4 + 24\,r^5\,sin(\theta)^2\,J^2))\,/\,(r^2\,sin(\theta)^2\,(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^3)$

(%i40) ```/* Coulomb law */```
```
       DivE : R0101 + R0202 + R0303;
```

(%o40) $(2\,r\,(4\,r^6\,M^3 - 112\,r^3\,sin(\theta)^2\,J^2\,M^2 - 4\,r^7\,M^2 + 64\,sin(\theta)^4\,J^4\,M +$

$104\,r^4\,sin(\theta)^2\,J^2\,M + r^8\,M + 96\,r\,sin(\theta)^4\,J^4 - 26\,r^5\,sin(\theta)^2\,J^2))\,/$

$(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^3 - (r\,(4\,r^6\,M^3 - 160\,r^3\,sin(\theta)^2\,J^2\,M^2 - 4\,r^7\,M^2 +$

$1024\,sin(\theta)^4\,J^4\,M + 176\,r^4\,sin(\theta)^2\,J^2\,M - 32\,r^4\,cos(\theta)^2\,J^2\,M + r^8\,M - 768\,r$

$sin(\theta)^4\,J^4 - 48\,r^5\,sin(\theta)^2\,J^2 + 16\,r^5\,cos(\theta)^2\,J^2))\,/$

$(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^3 -$

$\dfrac{r\,(2\,r^3\,M^2 + 8\,sin(\theta)^2\,J^2\,M - r^4\,M - 4\,r\,sin(\theta)^2\,J^2 - 16\,r\,cos(\theta)^2\,J^2)}{(2\,r^3\,M - 16\,sin(\theta)^2\,J^2 - r^4)^2}$

(%i41) ratsimp(DivE);

(%o41) $-$ (48 r^4 $sin(\theta)^2$ J^2 M^2 +

(768 r $sin(\theta)^4$ J^4 + ($-$ 32 r^5 $sin(\theta)^2$ $-$ 64 r^5 $cos(\theta)^2$)J^2) M +

(256 r^2 $cos(\theta)^2$ $sin(\theta)^2$ $-$ 896 r^2 $sin(\theta)^4$) J^4 + (8 r^6 $sin(\theta)^2$ + 32 r^6 $cos(\theta)^2$) J^2) /

(8 r^9 M^3 + ($-$ 192 r^6 $sin(\theta)^2$ J^2 $-$ 12 r^{10}) M^2 +

(1536 r^3 $sin(\theta)^4$ J^4 + 192 r^7 $sin(\theta)^2$ J^2 + 6 r^{11}) M $-$ 4096 $sin(\theta)^6$ J^6 $-$ 768 r^4

$sin(\theta)^4$ J^4 $-$ 48 r^8 $sin(\theta)^2$ J^2 $-$ r^{12})

(%i42) /* J[r] */
        Jr : -(R1010 + R1212 + R1313);

(%o42) $-$ ((2 M $-$ r) (4 r^6 M^3 + 176 r^3 $sin(\theta)^2$ J^2 M^2 $-$ 4 r^7 M^2 $-$ 512 $sin(\theta)^4$

J^4 M $-$ 208 r^4 $sin(\theta)^2$ J^2 M + r^8 M + 192 r $sin(\theta)^4$ J^4 + 60 r^5 $sin(\theta)^2$ J^2)) /

(r^4 (2 r^3 M $-$ 16 $sin(\theta)^2$ J^2 $-$ r^4)^2) + (2 (2 M $-$ r) (4 r^6 M^3 $-$ 64 r^3 $sin(\theta)^2$ J^2

M^2 $-$ 4 r^7 M^2 + 256 $sin(\theta)^4$ J^4 M + 56 r^4 $sin(\theta)^2$ J^2 M + r^8 M $-$ 96 r $sin(\theta)^4$ J^4

$-$ 14 r^5 $sin(\theta)^2$ J^2)) / (r^4 (2 r^3 M $-$ 16 $sin(\theta)^2$ J^2 $-$ r^4)^2) $-$ $\dfrac{M(2M-r)}{r^4}$

(%i43) ratsimp(Jr);

(%o43) $-$ (480 r^3 $sin(\theta)^2$ J^2 M^3 + ($-$ 1536 $sin(\theta)^4$ J^4 $-$ 816 r^4 $sin(\theta)^2$ J^2) M^2 +

(1536 r $sin(\theta)^4$ J^4 + 464 r^5 $sin(\theta)^2$ J^2) M $-$ 384 r^2 $sin(\theta)^4$ J^4 $-$ 88 r^6 $sin(\theta)^2$ J^2

) / (4 r^{10} M^2 + ($-$ 64 r^7 $sin(\theta)^2$ J^2 $-$ 4 r^{11}) M + 256 r^4 $sin(\theta)^4$ J^4 + 32 r^8

$sin(\theta)^2$ J^2 + r^{12})

(%i44) /* J[theta] */
        Jtheta : -(R2020 + R2121 + R2323);

(%o44) (4 r^6 M^3 $-$ 64 r^3 $sin(\theta)^2$ J^2 M^2 $-$ 4 r^7 M^2 + 256 $sin(\theta)^4$ J^4 M + 80 r^4

$sin(\theta)^2$ J^2 M $-$ 32 r^4 $cos(\theta)^2$ J^2 M + r^8 M $-$ 384 r $sin(\theta)^4$ J^4 $-$ 24 r^5 $sin(\theta)^2$

J^2 + 16 r^5 $cos(\theta)^2$ J^2) / (r^5 (2 r^3 M $-$ 16 $sin(\theta)^2$ J^2 $-$ r^4)^2) $-$

$\dfrac{2(2r^3 M^2 + 8 sin(\theta)^2 J^2 M - r^4 M - 12 r sin(\theta)^2 J^2)}{r^5(2r^3 M - 16 sin(\theta)^2 J^2 - r^4)}$ + $\dfrac{M}{r^5}$

(%i45) ratsimp(Jtheta);

(%o45) $-$ (96 r^3 $sin(\theta)^2$ J^2 M^2 +

((32 r^4 $cos(\theta)^2$ $-$ 144 r^4 $sin(\theta)^2$)J^2 $-$ 768 $sin(\theta)^4$ J^4) M + 768 r $sin(\theta)^4$ J^4 +

(48 r^5 $sin(\theta)^2$ $-$ 16 r^5 $cos(\theta)^2$) J^2) / (4 r^{11} M^2 + ($-$ 64 r^8 $sin(\theta)^2$ J^2 $-$ 4 r^{12}) M +

$$256 \; r^5 \; sin(\theta)^4 \; J^4 + 32 \; r^9 \; sin(\theta)^2 \; J^2 + r^{13} \;)$$

(%i46) /* J[phi] */
        Jphi : -(R3030 + R3131 + R3232);

(%o46) $(8 \; r^6 \; M^4 + 352 \; r^3 \; sin(\theta)^2 \; J^2 \; M^3 - 12 \; r^7 \; M^3 - 1024 \; sin(\theta)^4 \; J^4 \; M^2 -$

$688 \; r^4 \; sin(\theta)^2 \; J^2 \; M^2 + 6 \; r^8 \; M^2 + 1280 \; r \; sin(\theta)^4 \; J^4 \; M + 424 \; r^5 \; sin(\theta)^2 \; J^2 \; M -$

$r^9 \; M - 320 \; r^2 \; sin(\theta)^4 \; J^4 - 84 \; r^6 \; sin(\theta)^2 \; J^2 \;) \; / \; (\; r^2 \; sin(\theta)^2$

$(2 \; r^3 \; M - 16 \; sin(\theta)^2 \; J^2 - r^4)^3 \;) - (\; 2 \; (2 \; M - r) \; (\; 4 \; r^6 \; M^3 - 16 \; r^3 \; sin(\theta)^2 \; J^2 \; M^2 - 4$

$r^7 \; M^2 - 128 \; sin(\theta)^4 \; J^4 \; M - 40 \; r^4 \; sin(\theta)^2 \; J^2 \; M + r^8 \; M + 384 \; r \; sin(\theta)^4 \; J^4 + 128$

$r \; cos(\theta)^2 \; sin(\theta)^2 \; J^4 + 24 \; r^5 \; sin(\theta)^2 \; J^2 \;) \;) \; / \; (\; r^2 \; sin(\theta)^2$

$(2 \; r^3 \; M - 16 \; sin(\theta)^2 \; J^2 - r^4)^3 \;) +$

$$\frac{(2 \; M - r)(2 \; r^3 \; M^2 + 8 \; sin(\theta)^2 \; J^2 \; M - r^4 \; M - 4 \; r \; sin(\theta)^2 \; J^2 - 16 \; r \; cos(\theta)^2 \; J^2)}{r^2 \; sin(\theta)^2 (2 \; r^3 \; M - 16 \; sin(\theta)^2 \; J^2 - r^4)^2}$$

(%i47) ev(ratsimp(Jphi),r);

(%o47) $(384 \; r^3 \; sin(\theta)^2 \; J^2 \; M^3 +$

$((-544 \; r^4 \; sin(\theta)^2 - 64 \; r^4 \; cos(\theta)^2)J^2 - 768 \; sin(\theta)^4 \; J^4 \;) M^2 +$

$((256 \; r^5 \; sin(\theta)^2 + 64 \; r^5 \; cos(\theta)^2)J^2 - 256 \; r \; sin(\theta)^4 \; J^4 \;) M + 384 \; r^2 \; sin(\theta)^4 \; J^4 +$

$(-40 \; r^6 \; sin(\theta)^2 - 16 \; r^6 \; cos(\theta)^2) \; J^2 \;) \; / \; (\; 8 \; r^{11} \; sin(\theta)^2 \; M^3 +$

$(-192 \; r^8 \; sin(\theta)^4 \; J^2 - 12 \; r^{12} \; sin(\theta)^2 \;) M^2 +$

$(1536 \; r^5 \; sin(\theta)^6 \; J^4 + 192 \; r^9 \; sin(\theta)^4 \; J^2 + 6 \; r^{13} \; sin(\theta)^2 \;) M - 4096 \; r^2 \; sin(\theta)^8 \; J^6 -$

$768 \; r^6 \; sin(\theta)^6 \; J^4 - 48 \; r^{10} \; sin(\theta)^4 \; J^2 - r^{14} \; sin(\theta)^2 \;)$

(%i48) DivE_p: ratsimp(ev(at(DivE,[M=2, J=1,theta=%pi/2])));

(%o48) $\dfrac{8 \; r^6 - 64 \; r^5 + 192 \; r^4 - 896 \; r^2 + 1536 \; r}{r^{12} - 12 \; r^{11} + 48 \; r^{10} - 64 \; r^9 + 48 \; r^8 - 384 \; r^7 + 768 \; r^6 + 768 \; r^4 - 3072 \; r^3 + 4096}$

(%i49) Jr_p: ratsimp(ev(at(Jr,[M=2, J=1,theta=%pi/2])));

(%o49) $\dfrac{88 \; r^6 - 928 \; r^5 + 3264 \; r^4 - 3840 \; r^3 + 384 \; r^2 - 3072 \; r + 6144}{r^{12} - 8 \; r^{11} + 16 \; r^{10} + 32 \; r^8 - 128 \; r^7 + 256 \; r^4}$

(%i50) Jtheta_p: ratsimp(ev(at(Jtheta,[M=2, J=1,theta=%pi/2])));

(%o50) $- \dfrac{48}{r^8 - 2 \; r^7 - 4 \; r^6 - 8 \; r^5}$

(%i51) Jphi_p: ratsimp(ev(at(Jphi,[M=2, J=1,theta=%pi/2])));

(%o51) $\dfrac{40\,r^6 - 512\,r^5 + 2176\,r^4 - 3072\,r^3 - 384\,r^2 + 512\,r + 3072}{r^{14} - 12\,r^{13} + 48\,r^{12} - 64\,r^{11} + 48\,r^{10} - 384\,r^9 + 768\,r^8 + 768\,r^6 - 3072\,r^5 + 4096\,r^2}$
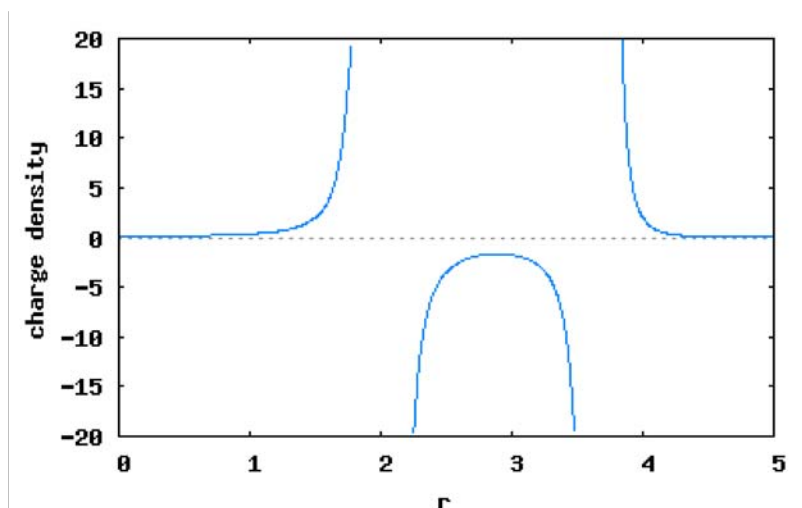
(%i52)

```
wxplot2d([DivE_p], [r,0,5],[y,-20,20], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "charge density"])$
```

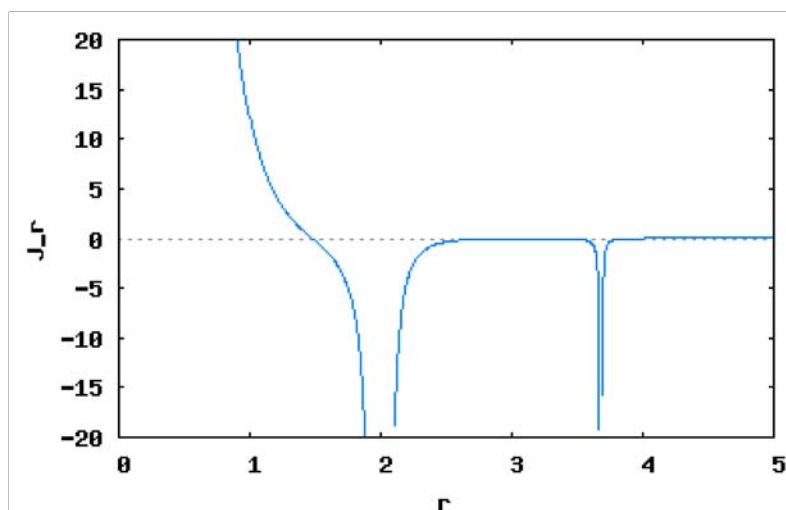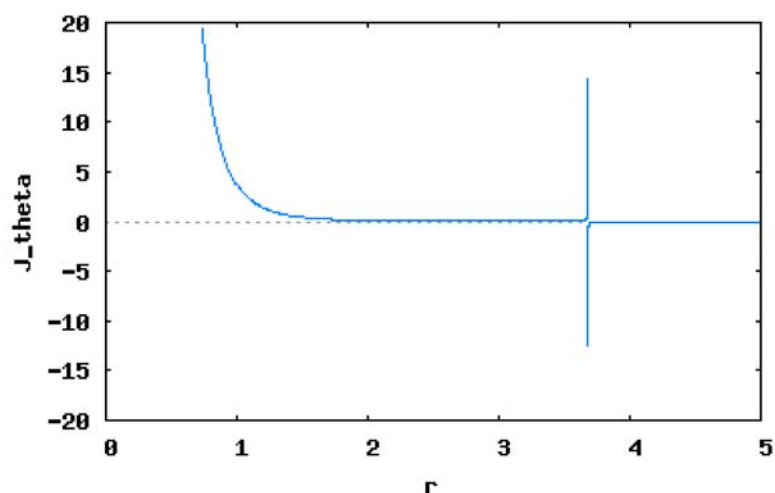Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t52)

(%i53)

```
wxplot2d([Jr_p], [r,0,5],[y,-20,20], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_r"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t53)

(%i54)

```
wxplot2d([Jtheta_p], [r,0,5],[y,-20,20], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_theta"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t54)

(%i55)

```
wxplot2d([Jphi_p], [r,0,5],[y,-20,20], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_phi"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t55)
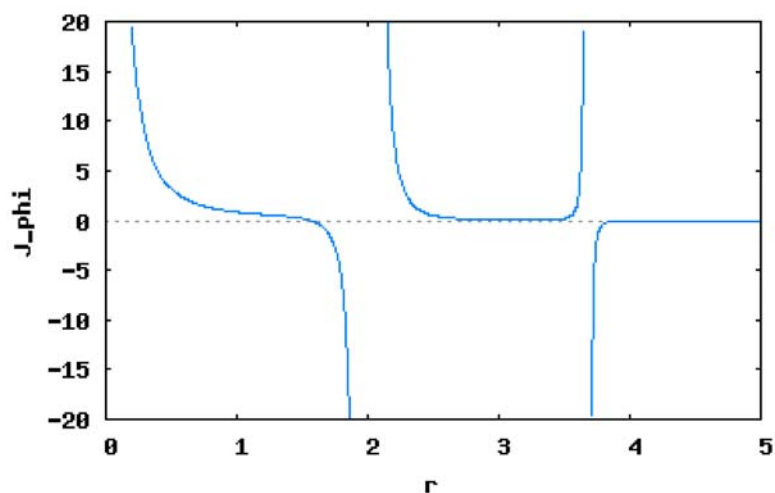
(%i56) `DivE_p: ratsimp(ev(at(DivE,[M=1, J=2,theta=%pi/2])));`

(%o56)
$$\frac{32 r^6 - 128 r^5 + 192 r^4 - 14336 r^2 + 12288 r}{r^{12} - 6 r^{11} + 12 r^{10} - 8 r^9 + 192 r^8 - 768 r^7 + 768 r^6 + 12288 r^4 - 24576 r^3 + 262144}$$

(%i57) `Jr_p: ratsimp(ev(at(Jr,[M=1, J=2,theta=%pi/2])));`

(%o57)
$$\frac{352 r^6 - 1856 r^5 + 3264 r^4 - 1920 r^3 + 6144 r^2 - 24576 r + 24576}{r^{12} - 4 r^{11} + 4 r^{10} + 128 r^8 - 256 r^7 + 4096 r^4}$$

(%i58) `Jtheta_p: ratsimp(ev(at(Jtheta,[M=1, J=2,theta=%pi/2])));`

(%o58)
$$-\frac{192 r - 192}{r^9 - 2 r^8 + 64 r^5}$$

(%i59) `Jphi_p: ratsimp(ev(at(Jphi,[M=1, J=2,theta=%pi/2])));`

(%o59) $\dfrac{160\,r^6 - 1024\,r^5 + 2176\,r^4 - 1536\,r^3 - 6144\,r^2 + 4096\,r + 12288}{r^{14} - 6\,r^{13} + 12\,r^{12} - 8\,r^{11} + 192\,r^{10} - 768\,r^9 + 768\,r^8 + 12288\,r^6 - 24576\,r^5 + 262144\,r^2}$
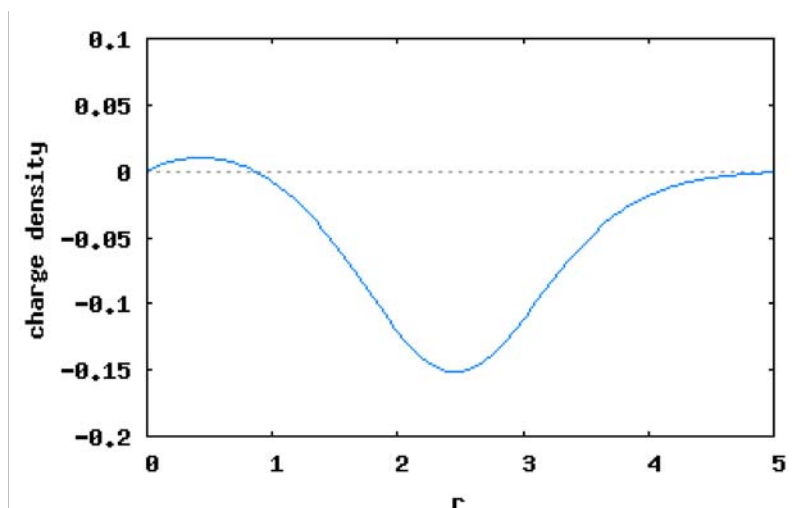
(%i60)

```
wxplot2d([DivE_p], [r,0,5],[y,-.2,.1], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "charge density"])$
```

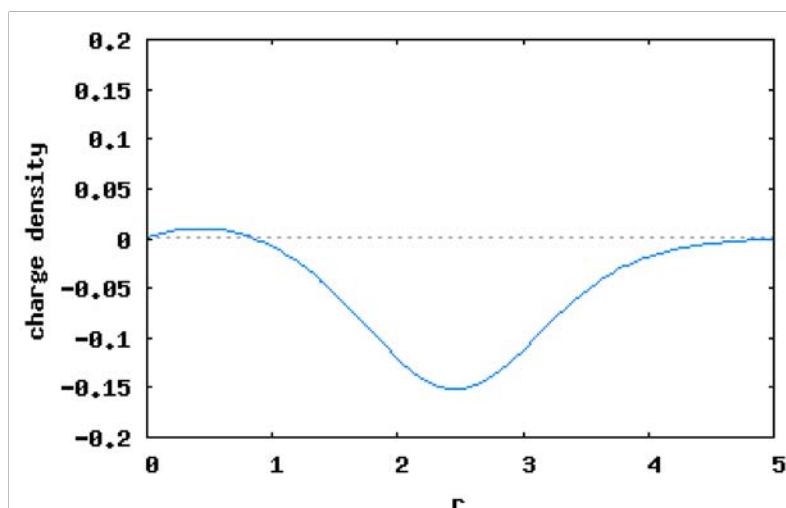Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t60)

(%i61)

```
wxplot2d([DivE_p], [r,0,5],[y,-.2,.2], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "charge density"])$
```

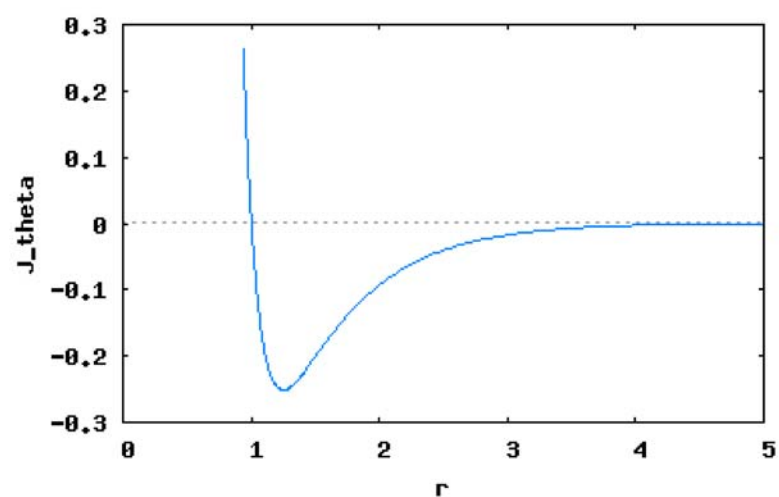Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t61)

(%i62)

```
wxplot2d([Jtheta_p], [r,0,5],[y,-.3,.3], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_theta"])$
```

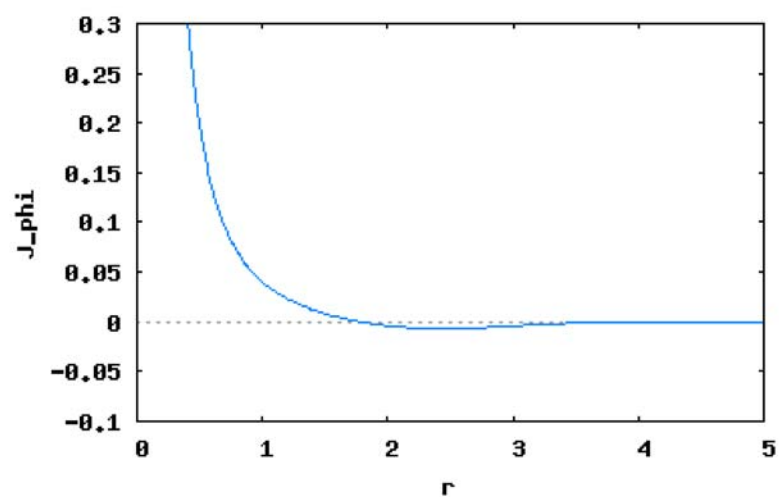Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t62)

(%i63)

```
wxplot2d([Jphi_p], [r,0,5],[y,-.1,.3], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_phi"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t63)

(%i64)