(%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, r, theta, phi];
```

(%o2) x

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

(%i4)
```
/* define function dependences */
depends([rho], [r, theta]);
depends([Lambda], [r]);
```

(%o4) $[\rho(r,\theta)]$

(%o5) $[\Lambda(r)]$

(%i6)
```
/* g1 is symm. metric with indices 1...4 */
g1: matrix(
 [-(1-rs*r/rho^2),0,0,2*rs*r*alpha/rho^2],
 [0,rho^2/Lambda^2,0,0],
 [0,0,rho^2,0],
 [2*rs*r*alpha/rho^2,0,0,r^2+alpha^2+rs*r*alpha^2/rho^2*sin(theta)^2]
);
```

(%o6)
$$\begin{bmatrix} \frac{r\,rs}{\rho^2}-1 & 0 & 0 & \frac{2\,\alpha\,r\,rs}{\rho^2} \\ 0 & \frac{\rho^2}{\Lambda^2} & 0 & 0 \\ 0 & 0 & \rho^2 & 0 \\ \frac{2\,\alpha\,r\,rs}{\rho^2} & 0 & 0 & \frac{\alpha^2\,r\,rs\,sin(\theta)^2}{\rho^2}+r^2+\alpha^2 \end{bmatrix}$$

(%i7)
```
/* contravariant g is inverse of g */
gContr1: ratsimp(invert(g1));
```

(%o7)

$$\begin{bmatrix} \frac{\alpha^2 r \rho^2 rs \sin(\theta)^2 + (r^2+\alpha^2)\rho^4}{(\alpha^2 r^2 rs^2 - \alpha^2 r \rho^2 rs)\sin(\theta)^2 - 4\alpha^2 r^2 rs^2 + (r^3+\alpha^2 r)\rho^2 rs + (-r^2-\alpha^2)\rho^4} & 0 & 0 & -\frac{}{(\alpha^2 r^2 rs^2 - \alpha^2 r \rho^2 rs} \\ 0 & \frac{\Lambda^2}{\rho^2} & 0 & \\ 0 & 0 & \frac{1}{\rho^2} & \\ -\frac{2\alpha r \rho^2 rs}{(\alpha^2 r^2 rs^2 - \alpha^2 r \rho^2 rs)\sin(\theta)^2 - 4\alpha^2 r^2 rs^2 + (r^3+\alpha^2 r)\rho^2 rs + (-r^2-\alpha^2)\rho^4} & 0 & 0 & \frac{}{(\alpha^2 r^2 rs^2 - \alpha^2 r \rho^2 rs)} \end{bmatrix}$$

(%i8)

```
/* 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]
}}$
```

(%i10)

```
/* 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)*/
}}}$
```

```
Division by 0
 -- an error.  To debug this try debugmode(true);
```

(%i10)

```
Maxima encountered a Lisp error:
 Console interrupt.
Automatically continuing.
To reenable the Lisp debugger set *debugger-hook* to nil.
```

(%i11)