```
> restart:
> grtw();
```

*GRTensorII Version 1.79 (R6)*

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*Latest version available from: http://grtensor.phy.queensu.ca/*

*e:/Grtii(6)/Metrics*

```
> qload(statica);
```

*Default spacetime = statica*

*For the statica spacetime:*

*Coordinates*

x(*up*)

$$x^{a} = [r, \theta, \phi, t]$$

*Line element*

$$ds^2 = \mathrm{a}(r)\ dr^2 + r^2\ d\theta^2 + r^2 \sin(\theta)^2\ d\phi^2 - \mathrm{b}(r)\ dt^2$$

```
> grcalc(G(dn,dn));
```

*CPU Time* = .050

```
> dsolve(grcomponent(G(dn,dn),[t,t])+Lambda*grcomponent(g(dn,dn),[t,
  t])=0,a(r));
```

$$\mathrm{a}(r) = -3\,\frac{r}{-3\,r + r^3\,\Lambda - 3\,\_C1}$$

```
The standard notation for the constant is -2*m
> a(r):=r/(r-r^3*Lambda/3-2*m);
```

$$\mathrm{a}(r) := \frac{r}{r - \frac{1}{3}\,r^3\,\Lambda - 2\,m}$$

```
> dsolve(grcomponent(G(dn,dn),[r,r])+Lambda*grcomponent(g(dn,dn),[r,
  r])=0,b(r));
```

$$\mathrm{b}(r) = \frac{\_C1\,(-3\,r + r^3\,\Lambda + 6\,m)}{r}$$

```
Scale t so that the constant is 1
> b(r):=-(-r+r^3*Lambda/3+2*m)/r;
```

$$\mathrm{b}(r) := -\frac{-r + \frac{1}{3}\,r^3\,\Lambda + 2\,m}{r}$$

```
> grdisplay(g(dn,dn));
```

*For the statica spacetime:*

*Covariant metric tensor*

g( *dn*, *dn* )

$$g_{a\ b} = \begin{bmatrix} \dfrac{r}{r - \frac{1}{3} r^3 \Lambda - 2\,m} & 0 & 0 & 0 \\ 0 & r^2 & 0 & 0 \\ 0 & 0 & r^2 \sin(\theta)^2 & 0 \\ 0 & 0 & 0 & \dfrac{-r + \frac{1}{3} r^3 \Lambda + 2\,m}{r} \end{bmatrix}$$

>