```
> restart; with(grtensor);
```

libname := "/Users/peter/maple/gitlab/GRTensorIII/lib",
"/Library/Frameworks/Maple.framework/Versions/2018/lib"

grOptionMetricPath := "/Users/peter/maple/gitlab/grtensor/metrics"

```
s=0x11199ea80, LENGTH=7, invalid FOR length
```

"GRTensor has detected correct length for inert FOR. Disregard the above error"

"

GRTensor III v2.2 Sept 26, 2018"

"Copyright 2017, Peter Musgrave, Denis Pollney, Kayll Lake"

"Latest version is at http://github.com/grtensor/grtensor"

"For help ?grtensor"

"Support/contact grtensor3@gmail.com"

[*Asym*, *KillingCoords*, *PetrovReport*, *Sym*, *autoAlias*, *cmcompare*, *difftool*, *grDalias*, **(1)**
grF_strToDef, *gralter*, *gralterd*, *grapply*, *grarray*, *grassign*, *grcalc*, *grcalc1*, *grcalcalter*,
grcalcd, *grclear*, *grcomponent*, *grconstraint*, *grdata*, *grdebug*, *grdef*, *grdisplay*, *grdump*,
greqn2set, *grinit*, *grload*, *grload_maplet*, *grmap*, *grmetric*, *grnewmetric*, *grnormalize*,
groptions, *grsaveg*, *grt2DG*, *grtestinput*, *grtransform*, *grundef*, *hypersurf*, *join*, *kdelta*,
makeg, *nprotate*, *nptetrad*, *qload*, *spacetime*]

```
> grOptionMetricPath := "/Users/peter/maple/gitlab/GRTensorIII/kayll/metrics/";
```

grOptionMetricPath := "/Users/peter/maple/gitlab/GRTensorIII/kayll/metrics/" **(2)**

```
> qload(schw);
```

```
Calculated ds for schw (0.001000 sec.)
```

Default spacetime = schw

For the schw spacetime:

Coordinates

$x(up)$

$$x^a = \left[\begin{array}{cccc} r & \theta & \phi & t \end{array} \right]$$

The Schwarzschild metric in curvature coordinates **(3)**

```
> qload(staticf);
```

```
Calculated ds for staticf (0.000000 sec.)
```

Default spacetime = staticf

For the staticf spacetime:

Coordinates

$x(up)$

$$x^a = \left[\begin{array}{cccc} t & r & \theta & \phi \end{array} \right]$$ **(4)**

```
> grdef("Dg{a b} := g{a b} - g < 1 > {a b}");
```

```
Created definition for Dg(dn,dn)
```

```
> grcalc( 1 = schw, Dg(dn, dn) );
```

```
Calculated Dg(dn,dn) for staticf (0.002000 sec.)
```

$$CPU\ Time = 0.004 \qquad \textbf{(5)}$$

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

For the staticf spacetime:

Dg(dn,dn)

$Dg(dn, dn)$

$$Dg_{a\ b} \qquad \textbf{(6)}$$

$$= \left[\left[-\frac{2 f(r)\ m - f(r)\ r - r}{-r + 2\ m}, 0, 0, 0 \right],\right.$$

$$\left[0, -\frac{r^2 f(r) - 1}{f(r)}, 0, 0\right],$$

$$\left[0, 0, r^2 - r^2 \sin(\theta)^2, 0\right],$$

$$\left.\left[0, 0, 0, \frac{r^3 \sin(\theta)^2 - 2\ m + r}{r}\right]\right]$$

```
>
```