In[19]:=
```
<< GRhelper`
```

```
Enter ?GRhelper for a list of functions

Enter ?FunctionName for a description of the function 'FunctionName'
```

In[20]:=
```
? GRhelper
```

In[23]:=
```
g1 = {{r^2, 0}, {0, r^2 Sin[θ]^2}};
```

In[24]:=
```
MatrixForm[g1]
```

Out[24]//MatrixForm=

$$\begin{pmatrix} r^2 & 0 \\ 0 & r^2\,\text{Sin}[\theta]^2 \end{pmatrix}$$

In[25]:=
```
coords = {θ, ϕ};
```

In[45]:=
```
cs1 = Affine[g1, coords];
```

In[27]:=
```
? PrettyR
```

Out[27]=

Symbol

PrettyR[*Riemann,coordinates*] = Prints out the Riemann (3 1) Tensor in a visually recognizable way

In[46]:=
```
PrettyCS[cs1 , Coords → coords, UseSymmetry → False]
```

Out[46]//TableForm=

$$\Gamma^{\theta}_{\phi\phi} = -\text{Cos}[\theta]\,\text{Sin}[\theta]$$

$$\Gamma^{\phi}_{\theta\phi} = \text{Cot}[\theta]$$

$$\Gamma^{\phi}_{\phi\theta} = \text{Cot}[\theta]$$

In[29]:=
```
r1 = Riemann[g1, coords]
```

Out[29]=

$$\{\{\{\{0, 0\}, \{0, 0\}\}, \{\{0, \text{Sin}[\theta]^2\}, \{-\text{Sin}[\theta]^2, 0\}\}\},\ \{\{\{0, -1\}, \{1, 0\}\}, \{\{0, 0\}, \{0, 0\}\}\}\}$$

In[30]:=
```
r1 // MatrixForm
```

Out[30]//MatrixForm=

$$\begin{pmatrix} \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} & \begin{pmatrix} 0 & \text{Sin}[\theta]^2 \\ -\text{Sin}[\theta]^2 & 0 \end{pmatrix} \\ \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} & \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \end{pmatrix}$$

```
(*  Two ways to call PrettyR  *)
```

```
(* 1. Implicit Arguments - coordinate numbers are used *)
r1 // PrettyR
```

Out[41]//TableForm=

$$\mathrm{R}^{1}{}_{221} = -\mathrm{Sin}[\theta]^2$$

$$\mathrm{R}^{2}{}_{121} = 1$$

In[43]:=
```
(* 2. Explicit Arguments - coordinate passed in Coords are used *)
PrettyR[r1, Coords → coords]
```

Out[43]//TableForm=

$$\mathrm{R}^{\theta}{}_{\phi\phi\theta} = -\mathrm{Sin}[\theta]^2$$

$$\mathrm{R}^{\phi}{}_{\theta\phi\theta} = 1$$

In[44]:=
```
(* 2. Explicit Arguments - UseSymmetry →
 False will show all symmetries nomally hidden *)
PrettyR[r1, Coords → coords, UseSymmetry → False]
```

Out[44]//TableForm=

$$\mathrm{R}^{\theta}{}_{\phi\theta\phi} = \mathrm{Sin}[\theta]^2$$

$$\mathrm{R}^{\theta}{}_{\phi\phi\theta} = -\mathrm{Sin}[\theta]^2$$

$$\mathrm{R}^{\phi}{}_{\theta\theta\phi} = -1$$

$$\mathrm{R}^{\phi}{}_{\theta\phi\theta} = 1$$