In[1]:=
```
coord = {t, r, θ, ϕ};
n = Length[coord];
```

In[3]:=
```
gMatrix = DiagonalMatrix[{
    (1 - Rs / r),
    -1 / c^2 1 / (1 - Rs / r),
    -1 / c^2 r^2,
    -1 / c^2 r^2 (Sin[θ])^2
   }];
gMatrix // MatrixForm
```

Out[4]//MatrixForm=

$$\begin{pmatrix} 1-\frac{Rs}{r} & 0 & 0 & 0 \\ 0 & -\frac{1}{c^2\left(1-\frac{Rs}{r}\right)} & 0 & 0 \\ 0 & 0 & -\frac{r^2}{c^2} & 0 \\ 0 & 0 & 0 & -\frac{r^2\,Sin[\theta]^2}{c^2} \end{pmatrix}$$

In[5]:=
```
g[i_, j_] := gMatrix[[i]][[j]]
gInv[i_, j_] := Inverse[gMatrix][[i]][[j]]
```

In[7]:=
```
GammaDown[i_, j_, k_] := 1 / 2 (
   D[g[i, k], coord[[j]]]
    + D[g[i, j], coord[[k]]]
    - D[g[j, k], coord[[i]]] )
```

In[8]:=
```
GammaUp[i_, j_, k_] := Sum[
  gInv[i, s] GammaDown[s, j, k],
  {s, 1, n}]
```

In[9]:=
```
NonZeroChristoffelSymbols = {};

For[i = 1, i ≤ n,
 For[j = 1, j ≤ n,
   For[k = j, k ≤ n,
     GammaTmp = Simplify[GammaUp[i, j, k]];

     (* In the next line <> is the JoinString operator *)
     GammaStatement = {ToString["Γ^"]
        <> ToString[coord[[i]]]
        <> "_"
        <> ToString[coord[[j]]]
        <> ToString[coord[[k]]]
        <> ToString[" ="],
       GammaTmp};

     (* Using the Simplify command we can check if an expre
     addCond = Simplify[GammaTmp == 0];

     (* If the expression is non-zero, add it to list of nc
      If[addCond == True, , ,
      NonZeroChristoffelSymbols = Append[NonZeroChristoffelS
     ];
     k++
    ]
    j++
  ]
  i++
]
NonZeroChristoffelSymbols // MatrixForm
```

Out[11]//MatrixForm=

$$\begin{pmatrix} \Gamma\text{^t\_tr} = \frac{Rs}{2r^2-2rRs} \\ \Gamma\text{^r\_tt} = \frac{c^2\,(r-Rs)\,Rs}{2r^3} \\ \Gamma\text{^r\_rr} = -\frac{Rs}{2r^2-2rRs} \\ \Gamma\text{^r\_}\theta\theta = -r+Rs \\ \Gamma\text{^r\_}\phi\phi = (-r+Rs)\,\text{Sin}[\theta]^2 \\ \Gamma\text{^}\theta\text{\_r}\theta = \frac{1}{r} \\ \Gamma\text{^}\theta\text{\_}\phi\phi = -\text{Cos}[\theta]\,\text{Sin}[\theta] \\ \Gamma\text{^}\phi\text{\_r}\phi = \frac{1}{r} \\ \Gamma\text{^}\phi\text{\_}\theta\phi = \text{Cot}[\theta] \end{pmatrix}$$

In[12]:=
```
R[b_, a_, d_, c_] :=
 D[GammaUp[c, b, d], coord[[a]]] -
  D[GammaUp[c, a, d], coord[[b]]] +
  Sum[GammaUp[e, b, d] GammaUp[c, e, a], {e, 1, n}] -
  Sum[GammaUp[e, a, d] GammaUp[c, e, b], {e, 1, n}]
```

In[13]:=
```
Ricci[a_, b_] := Sum[ R[a, i, b, i], {i, 1, n}]
```

In[14]:=
```
Table[
  Simplify[Ricci[a, b]],
  {a, 1, n}, {b, 1, n}] // MatrixForm
```

Out[14]//MatrixForm=

$$\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$