In[ ]:=
$$\text{vr} = \begin{pmatrix} \text{Sin}[\theta]\,\text{Cos}[\phi] \\ \text{Sin}[\theta]\,\text{Sin}[\phi] \\ \text{Cos}[\theta] \end{pmatrix};\quad \text{v}\theta = \begin{pmatrix} \text{Cos}[\theta]\,\text{Cos}[\phi] \\ \text{Cos}[\theta]\,\text{Sin}[\phi] \\ -\text{Sin}[\theta] \end{pmatrix};\quad \text{v}\phi = \begin{pmatrix} -\text{Sin}[\phi] \\ \text{Cos}[\phi] \\ 0 \end{pmatrix};$$

In[ ]:=
$$\text{coords} = \{r,\ \theta,\ \phi\};\ \text{vecs} = \{\text{vr},\ \text{v}\theta,\ \text{v}\phi\};\ \text{grad} = \left\{1,\ \frac{1}{r},\ \frac{1}{r\,\text{Sin}[\theta]}\right\};$$

In[ ]:=
```
comm[i_, j_] := grad[[i]] * D[vecs[[j]], coords[[i]]] - grad[[j]] * D[vecs[[i]], coords[[j]]]
```

In[ ]:=
```
commcoeff[i_, j_, k_] := Simplify[Transpose[comm[i, j]].vecs[[k]]]
```

In[ ]:=
```
conncoeff[i_, j_, k_] :=
  First[First[Simplify[1/2 (commcoeff[i, j, k] + commcoeff[i, k, j] - commcoeff[j, k, i])]]]
```

In[ ]:=
```
table :=
 Table[If[UnsameQ[conncoeff[i, j, k], 0], {ToString[Γ[i, j, k]], conncoeff[i, j, k]}],
  {i, 1, 3}, {j, 1, 3}, {k, 1, 3}]
```

In[ ]:=
```
TableForm[Partition[DeleteCases[Flatten[table], Null], 2], TableSpacing → {2, 2}]
```

Out[ ]//TableForm=

Γ[1, 2, 2]	$-\frac{1}{r}$
Γ[1, 3, 3]	$-\frac{1}{r}$
Γ[2, 1, 2]	$\frac{1}{r}$
Γ[2, 3, 3]	$-\frac{\text{Cot}[\theta]}{r}$
Γ[3, 1, 3]	$\frac{1}{r}$
Γ[3, 2, 3]	$\frac{\text{Cot}[\theta]}{r}$