1. GR 1.1

2. GR 1.2

3. Suppose in x coordinates a tensor $T^a{}_b$ has components equal to $\delta^a{}_b$. Write down in as simple a form you can the components in a different coordinate system $\hat{x}$. Then repeat this exercise if $T_{ab} = \delta_{ab}$ in x coordinates.

4. GR 4.4 Note: The notation $dt^2 - dr^2 - \sin^2(r)(d\theta^2) + \sin^2\theta\, d\phi^2$ with $x^0 = 1$, $x^1 = r$, $x^2 = \theta$ and $x^3 = \phi$ is shorthand for the metric g_{ab} in these coordinates with

$$[g_{ab}] = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -\sin^2 r & 0 \\ 0 & 0 & 0 & -\sin^2 r \sin^2\theta \end{pmatrix}$$

Ignore the suggestion about Lagrange's equations. Rather, compute the Christoffel symbols and write down the geodesic equations directly.