

Some equations you may need:

$$ii) \Gamma^{\mu}_{\alpha\beta} = \frac{1}{2} g^{\mu\kappa} \left(\frac{\partial g_{\alpha\kappa}}{\partial x^{\beta}} + \frac{\partial g_{\beta\kappa}}{\partial x^{\alpha}} - \frac{\partial g_{\alpha\beta}}{\partial x^{\kappa}} \right)$$

Sum over repeated index assumed.

$$iii) R^{\alpha}_{\beta\gamma\delta} = \frac{\partial \Gamma^{\alpha}_{\beta\delta}}{\partial x^{\gamma}} - \frac{\partial \Gamma^{\alpha}_{\beta\gamma}}{\partial x^{\delta}} + \Gamma^{\alpha}_{\gamma\epsilon} \Gamma^{\epsilon}_{\beta\delta} - \Gamma^{\alpha}_{\delta\epsilon} \Gamma^{\epsilon}_{\beta\gamma}$$

$$iii) R_{\alpha\beta} = \frac{\partial \Gamma^{\gamma}_{\alpha\beta}}{\partial x^{\gamma}} - \frac{\partial \Gamma^{\gamma}_{\alpha\gamma}}{\partial x^{\beta}} + \Gamma^{\gamma}_{\alpha\beta} \Gamma^{\delta}_{\gamma\delta} - \Gamma^{\gamma}_{\alpha\delta} \Gamma^{\delta}_{\beta\gamma}$$

$$\Gamma^{\gamma}_{\alpha\gamma} = \frac{1}{\sqrt{-g}} \frac{\partial(\sqrt{-g})}{\partial x^{\alpha}}, \quad g = \det(g_{\mu\nu})$$

$$iv) G^{\mu}_{\nu} = R^{\mu}_{\nu} - \frac{1}{2} \delta^{\mu}_{\nu} R = 8\pi G T^{\mu}_{\nu}$$

$$v) F^{\mu\nu} = \begin{bmatrix} 0 & -E^1 & -E^2 & -E^3 \\ E^1 & 0 & -B^3 & B^2 \\ E^2 & B^3 & 0 & -B^1 \\ E^3 & -B^2 & B^1 & 0 \end{bmatrix} \quad \text{or} \quad \begin{cases} F^{i0} = E^i \\ F^{ij} = -\epsilon^{ijk} B^k \end{cases}$$