Gravitational lensing of electromagnetic and gravitational waves ${\bf Tutoral\text{-}1}$

1. Derive the luminosity and angular diameter distances in FRW cosmologies from the metric.

$$ds^{2} = c^{2}dt^{2} - a^{2}(t)\left(\frac{dr^{2}}{1 - kr^{2}} + r^{2}d\theta^{2} + r^{2}\sin^{2}\theta d\phi^{2}\right)$$

2. Starting from geodesic equation compute the angle of deflection of light by a point mass.