4.4.2016

9. For a 1+1 and 2+1 dimensional spacetimes, consider a general coordinate transformation. Expand (as in class) the metric to the second order in a Taylor series. How many degrees of freedom at each spacetime point describe here curvature.

10. Show that the Christoffel "symbol" is not a tensor.

11. $ds^2 = (1 + A(r))dt^2 - r^2(dr^2 + sin^2(\theta)d\phi^2)$.
Calculate the Christoffel matrix and the geodesic equations for massive and massless particles.

12. Suppose $P_{\lambda\mu\nu}$, is such that $A^\lambda P_{\lambda\mu\nu}$, is a tensor for any vector A^λ. Then $P_{\lambda\mu\nu}$ is a tensor.