ASTR 680 Practice questions for lecture 7: Orthonormal Tetrads

1. A particle in a circular orbit at a circumferential radius r in the equatorial plane $(\theta = \pi/2)$ around a mass M, in the Schwarzschild geometry, has a specific angular momentum u_ϕ. Compute all components of the orthonormal tetrad: $u^{\hat{\alpha}}$ and $u_{\hat{\alpha}}$, where $\alpha = t, r, \theta, \phi$.

2. Derive equation (9) in the notes, which gives the radial component of the geodesic equation.

3. Verify explicitly that the "???" in equation (14) in the notes is zero; that is, calculate the connection coefficients.