

Solutions Guide to Homework – Physics 451 Fall 2003

Vector Spaces and Tensor Analysis

§14. The Riemann Tensor

1.

$$g_{\mu\nu} = \begin{pmatrix} -1/f(r) & 0 & 0 & 0 \\ 0 & -r^2 & 0 & 0 \\ 0 & 0 & -r^2 \sin^2 \theta & 0 \\ 0 & 0 & 0 & f(r) \end{pmatrix}$$

$$R_{114}^1 = 0$$

$$R_{114}^4 = \frac{-2GM}{r^2(r - 2GM)}$$

In flat space both are zero, which is to be expected since there are no gravitating sources.