

1. Consider the Reissner-Nordström geometry, with line element

$$-f(r) dt^2 + \frac{dr^2}{f(r)} + r^2(d\theta^2 + \sin^2\theta d\phi^2)$$

where  $f(r) = 1 - \frac{2m}{r} + \frac{q^2}{r^2}$ . Determine the components  $R_{ij}$  of the Ricci curvature.

*You may use any formalism you wish, and any coordinate system you wish. Tedious computation by hand is discouraged, as is trying to fully typeset your results. Other options include using computer algebra and/or using or adapting a computation published elsewhere. Such strategies must of course be documented. However, make sure you understand—and clearly describe—the conventions being used! One reasonable starting point would be the curvature 2-forms, and the relations*

$$\begin{aligned}\Omega^i{}_j &= \frac{1}{2} R^i{}_{jkl} \sigma^k \wedge \sigma^l \\ R_{ij} &= R^m{}_{imj}\end{aligned}$$

*where repeated indices are summed over.*