GENERAL RELATIVITY WS 2017/2018
Technische Universität München
December 10, 2017

Exercise Sheet 8[*]

The solutions to the following problem set should be handed in by the 17th of December at 8:30 a.m. at the postbox next to PH 3218.

---

1. Consider the Einstein-Hilbert action, but this time regard $g_{\mu\nu}$ as independent from $\Gamma^{\lambda}_{\mu\nu}$. In this sense the Ricci tensor $R_{\mu\nu}$ depends only on the Γ's. Show that by assuming no torsion (symmetry among μ and ν in the Γ's) and by varying the action with respect the connection symbols, one can conclude the connection should be metric compatible, namely that $g_{\mu\nu}$ is given by the Christoffel symbols.

2. Imagine the four-potential A_{μ} is a Killing vector. If the metric satisfies Einstein's equation in vacuum, show that A satisfies Maxwell's equation automatically.