

Homework 7 - Einstein equation

Q7.1. Use the Bianchi identity

$$\nabla_{\mathbf{a}} R_{\mathbf{bcd}}^{\mathbf{e}} + \nabla_{\mathbf{b}} R_{\mathbf{cad}}^{\mathbf{e}} + \nabla_{\mathbf{c}} R_{\mathbf{abd}}^{\mathbf{e}} = 0 \quad (\text{Q7.1.1})$$

to show that

$$\nabla_{\mathbf{b}} G_{\mathbf{a}}^{\mathbf{b}} = 0 \quad (\text{Q7.1.2})$$

Q7.2. Calculate

$$\nabla_{\mathbf{b}} T_{\mathbf{a}}^{\mathbf{b}} = 0 \quad (\text{Q7.2.1})$$

for a perfect fluid and interpret your answer.