

Homework 10 - Weyl tensor

Q10.1. Show that

$$C_{\text{abc}}{}^{\text{b}} = 0 \quad (\text{Q10.1.1})$$

Q10.2. Show that in four dimensional spacetime

$$\nabla_{\text{d}} C_{\text{abc}}{}^{\text{d}} = -\nabla_{[\text{a}} D_{\text{b]c}} \quad (\text{Q10.2.1})$$

where

$$D_{\text{bc}} = R_{\text{bc}} - \frac{1}{6} R g_{\text{bc}} \quad (\text{Q10.2.2})$$

Q10.3. Show that

(a) in one dimension

$$R_{\text{abcd}} = 0 \quad (\text{Q10.3.1})$$

(b) in two or less dimensions

$$G_{\text{ab}} = 0 \quad (\text{Q10.3.2})$$

(c) in three or less dimensions

$$C_{\text{abcd}} = 0 \quad (\text{Q10.3.3})$$

and interpret these results physically.