ADVANCED DYNAMICS — PHY–4241/5227

HOMEWORK 10

(March 15, 2004)

Due Monday, March 22, 2004 (late afternoon)

PROBLEM 24

(a) Show $\epsilon_{\alpha\beta\gamma\delta} = -\epsilon^{\alpha\beta\gamma\delta}$. (Definition: $\epsilon_{\alpha_1\beta_1\gamma_1\delta_1} = g_{\alpha_1\alpha_2} g_{\beta_1\beta_2} g_{\gamma_1\gamma_2} g_{\delta_1\delta_2} \epsilon^{\alpha_2\beta_2\gamma_2\delta_2}$.)

(b) Show that $\epsilon_{\alpha\beta\gamma_1\delta_1}\epsilon^{\alpha\beta\gamma_2\delta_2} = 2(\delta_{\gamma_1}{}^{\delta_2}\delta_{\delta_1}{}^{\gamma_2} - \delta_{\gamma_1}{}^{\gamma_2}\delta_{\delta_1}{}^{\delta_2})$.

(c) How many independent elements has a rank two tensor, a symmetric rank two tensor, and an antisymmetric rank two tensor?

PROBLEM 25

Griffiths 12.34