P621—Quantum Field Theory
Fall, 2011
Problem Set 1
Due: Tuesday, September 13

1.) Problem 1.1 from Srednicki

2.) A Lorentz transformation obeys the condition

$$g_{\mu\nu}\Lambda^{\mu}{}_{\rho}\Lambda^{\nu}{}_{\sigma} = g_{\rho\sigma}.$$

Show that if Λ_1 and Λ_2 obey the condition, then $\Lambda_3{}^{\mu}{}_{\nu} = \Lambda_2{}^{\mu}{}_{\alpha}\Lambda_1{}^{\alpha}{}_{\nu}$ obeys the condition. That is, show that the product of two Lorentz transformations is a Lorentz transformation.

3.) Problem 2.4 from Srednicki

4.) Problem 2.5 from Srednicki

5.) Problem 2.9 from Srednicki. The hint for part (b) involves a clever extension of something in problem 2.8, but since that is not assigned, it is probably most easy for you to straightforwardly do the calculation starting with Eq. (2.33).