Physics 745 - Group Theory
Homework Set 30
Due Wednesday, April 20

1. The mass of the Ω^- can be predicted in terms of the parameters a and b from eq. (4.36).
   (a) Find the formula for the Ω^- mass in terms of a and b.
   (b) Comparing with some of the other formulas, write a formula for the Ω^- mass in terms of some combination of the Δ, Σ^* and/or Ξ^* masses. There is more than one correct answer to this part.
   (c) Check against the experimental value $m_\Omega = 1672$ MeV/c^2.

2. Equation (4.40) is not complete – it doesn't show where all the indices go
   (a) Write this equation correctly, with all the indices eliminated. You will have to have *three* coefficients in this case, which I called a, b, and c.
   (b) Find an equation for each of the masses m_K^2, $m_{\bar{K}}^2$, m_π^2, and m_η^2 in terms of a, b, and c.
   (c) Find a linear equation relating these four masses, *i.e.*, eliminate a, b, and c. Arrange it so only positive coefficients appear on each side of the equation. Check it numerically
   (d) An identical relationship should exist for the four masses (not masses squared) for the octuplet baryons. Check it numerically as well.