Homework Set # 2, due February 18, 2007

1. Show that the Higgs mechanism does not give mass to the photon.

2. Show that the part of the weak Lagrangian describing the interactions of quarks and the $Z$-boson is given by

   \[ \mathcal{L}_0 = -\frac{g}{2\cos\theta_W} \sum_q \bar{\psi}_q \gamma_\mu (g_V - G_A \gamma_5) \psi_q Z_\mu. \]  

   Find expressions for $g_V$ and $g_A$.

3. Discuss isospin selection rules for weak interactions for
   a) nonstrange decays, and
   b) decays involving a change of strangeness.