Week 7 (due Nov. 18)

Reading: Schwartz 28.1-28.2.

1. Problem 28.3 in Schwartz.

2. Consider the chiral $SU(3) \times SU(3)$ lagrangian

$$L = \frac{F_\pi^2}{4} \text{Tr} \, \partial_\mu U^\dagger \partial^\mu U + v^3 \text{Tr}(MU + MU^\dagger),$$

where M is a diagonal matrix $\text{diag}(m_u, m_d, m_s)$.

(a) Compute the masses of the mesons in the limit where the isospin symmetry is unbroken, i.e. $m_u = m_d$.

(b) Compute the leading interaction term between mesons arising from the mass term in the chiral lagrangian. Express it in terms of canonically normalized meson fields.

(c) Compute the $SU(3)_A$ and $SU(3)_V$ currents in terms of canonically normalized meson fields to cubic order in the fields.