QCD
Problem set #6
Monday, November 25, 10:00, A-1-13

1. Finish anomaly calculation from the previous set.

2. General fermionic mass term reads:

$$M \,\bar{\psi}\frac{1+\gamma_5}{2}\psi + M^* \,\bar{\psi}\frac{1-\gamma_5}{2}\psi. \tag{1}$$

   Prove that (1) is Hermitean. Show that chiral transformation

$$\psi \to e^{i\alpha\gamma_5}\psi$$

   ammounts to

$$M \to e^{2i\alpha}M.$$

3. Prove that

$$\partial_\mu K^\mu = \frac{1}{2}\varepsilon^{\mu\nu\rho\sigma}F^a_{\mu\nu}F^a_{\rho\sigma}$$

   where

$$K^\mu = \varepsilon^{\mu\nu\rho\sigma}\left(A^a_\nu F^a_{\rho\sigma} - \frac{g}{3}f^{abc}A^a_\nu A^b_\rho A^c_\sigma\right).$$