PHYS 579C • **problem set 13** • Fall 2006

Due: Dec 6 (Wednesday)

- **1.** Show that for the auxiliary field F, supersymmetry algebra closes:

$$(\delta_{\epsilon_1}\delta_{\epsilon_2} - \delta_{\epsilon_2}\delta_{\epsilon_1})F = i(\epsilon_1\sigma^\mu\epsilon_2^\dagger - \epsilon_2\sigma^\mu\epsilon_1^\dagger)\partial_\mu F \tag{1}$$

- **2.**The superpotential for MSSM is (for third generation)

$$\begin{aligned} W_{MSSM} &= y_t(\bar{t}tH_u^0 - \bar{t}bH_u^+) - y_b(\bar{b}tH_d^- - \bar{b}bH_d^0) - y_b(\bar{b}tH_d^- - \bar{b}bH_d^0) - y_\tau(\bar{\tau}\nu_\tau H_d^- - \bar{\tau}\tau H_d^0) \\ &\quad +\mu(H_u^+H_d^- - H_u^0H_d^0). \end{aligned} \tag{2}$$

Work out
a) Mass term for Higgses and Higgsinos.
b) Yukawa type interactions.
c) Tri-scalar interactions.
d) Four-scalar interactions.

Draw the corresponding Feynman diagram for each interactions.