

## Week 8 (due March 5)

Reading: Srednicki, sections 45, 46, 47, 48.

1. (40pt) Consider the Yukawa theory with the  $\phi\bar{\Psi}\Psi$  interaction. Compute the spin-averaged differential cross-section for the process  $e^+e^- \rightarrow e^+e^-$  as a function of the scattering angle in the center-of-mass frame, to leading order in perturbation theory. For simplicity, assume that both  $\Psi$  and  $\phi$  are massless. (The analogous process in QED, with photon instead of the  $\phi$  field, is known as Bhabha scattering.)

2. (40pt) Consider the Yukawa theory with the  $\phi\bar{\Psi}\Psi$  interaction. Compute the spin-averaged differential cross-section for the process  $e^+e^- \rightarrow \phi\phi$  as a function of the scattering angle in the center-of-mass frame, to leading order in perturbation theory. For simplicity, assume that both  $\Psi$  and  $\phi$  are massless.