Warning: these notes have been translated from the normal metric to the Peskin metric $(+,-,-,-)$.

Third (not-counting the extra-credit one) homework assignment:

(1) In the theory of a charged scalar field ψ interacting with a neutral scalar field ϕ via the interaction hamiltonian density

$$\mathcal{H}_I = g\psi^\dagger(x)\psi(x)\phi(x) \tag{0.1}$$

compute to lowest order in the coupling constant g the amplitude $\langle p_1' p_2' | U(\infty, -\infty) | p_1 p_2 \rangle$ for the scattering of two charged particles.

(2) In the same theory, compute to lowest order in the coupling constant g the amplitude $\langle p_1' p_2' | U(\infty, -\infty) | p_1 p_2 \rangle$ for the scattering of a charged anti-particle by a neutral boson.