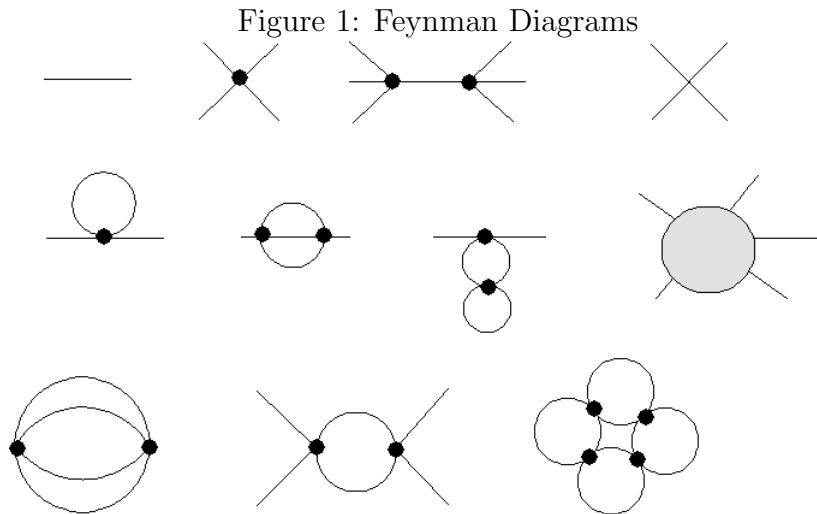


Problem Set 5 (due Mar 21, 2014)

1. **Wick's theorem** Prove Wick's theorem for $m = 2$ fields (Eq. (4.37) in Peskin). Explicitly perform the induction step going from $m = 2$ to $m = 3$

2. **Fun with Feynman diagrams** Write the expressions for the 12 Feynman diagrams for (use correlation function Feynman rules) given below for the ϕ^4 theory. Give results both in position and momentum space. Introduce appropriate symbols for external and internal space-time locations (four momenta for momentum space) and explicitly show the symmetry factors. You can write the results in terms of the position space Feynman propagator D_F and the momentum space propagator $\frac{i}{p^2 - m^2 + i\epsilon}$ (Peskin conventions) but give the correct arguments and appropriate integrals. You need not evaluate the integrals



3. **In/Out states** Read Peskin Chapter 2: Particle creation by a classical source (page 32, 33). Peskin Problem 4.1