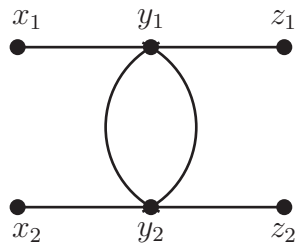


831 Homework set 10 (due Nov.17)

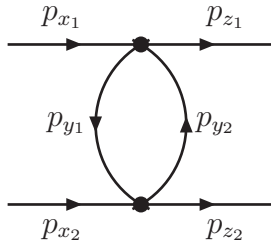
(1). Feynman amplitude in ϕ^4 :

Follow the Feynman rules for the ϕ^4 theory listed on pages 94 and 95 of Peskin and Schroeder, write down the explicit integral amplitude expressions for the 1-loop Feynman diagram

(a). in position space:



(b). in momentum space, and show that they are equivalent.



(2). Dimensionality of scattering amplitudes:

By examining the cross section formula for $2 \rightarrow n$ scattering [e.g., Eq.(4.79) of p.106], determine the dimensionality in mass-energy dimension for the n -body scattering amplitude $\mathcal{M}(A + B \rightarrow 1 + 2 + 3 + \dots + n)$. Also give your answers for the fewer-body scattering processes $2 \rightarrow 1$, $2 \rightarrow 2$ and $2 \rightarrow 3$.