Physics 613   Homework #5
Due March 3, 2014 at 4:00 EST

1:   Consider the ABC theory with $m_A = m_B = m_C = m > 0$. Give the lowest order nonvanishing contribution to the scattering amplitude $A + B \rightarrow A + A + C$. Call the initial momenta k_A and k_B and the final momenta p_A and p'_A and p_C.

Hints: The time ordering does not affect the contractions with the external creation and annihilation operators, and just places time orderings on the contractions of $\hat{\phi}$'s with each other, to convert them into Feynman propagators. The permutations of n space-time points from the n'th order in the expansion of the exponential cancels the $1/n!$ if you have a unique way of settling which point is which (*e.g.* setting which x_j contracts with which external momentum). Furthermore, the final answer must be symmetric under $p_A \leftrightarrow p'_A$, but this may be implimented by writing down half the amplitude and adding "$+(p_A \leftrightarrow p'_A)$".