PHY 5667 : Quantum Field Theory A, Fall 2004

November 23^{th}, 2004

Final Exam

(due Thursday December 9^{th}, 2004, by 12:00 pm)

1. Derive *Klein-Nishina formula* (Eq. (5.91)) showing all the details of your calculation. The structure of the calculation is fully explained in Sec. 5.5 of Peskin and Schroeder's book. Here you have to show that you are able to reproduce each single step, in its integrity, i.e. considering all the contributing terms even where the book only sketches some of them.

2. Show explicitly (i.e. calculating it explicitly) that at one loop in QED:

2.a) the three photon vertex is zero;

2.b) the four photon vertex is UV finite, i.e. it does not give origin to ultraviolet divergences.

Explain why this is important for the renormalizability of the theory.