

## HOMEWORK 3

**Physics 751  
Advanced Solid State Physics  
Fall, 2001**

1. Show that the diagram

(1)

does not contribute to the scattering amplitude of two particles *in a vacuum*.

2. Analyze the Kohn-Luttinger effect in two dimensions, to the lowest-order in the iteration. Hint: the effect is due to particles at the Fermi surface, for which the momentum transfer is smaller than  $2p_F$ .

3. Show that the expression for the superconducting gap,  $\Delta$ , is free from ultraviolet divergencies when  $\Delta$  is expressed in terms of the scattering amplitude.