

Physics 417: Problem Set 11 (*DUE ON TUESDAY 12/10*)

Problem 1: Griffiths 5.7

Problem 2: Griffiths 5.11

Problem 3: Griffiths 5.16

Problem 4: Fermions in a harmonic oscillator potential

(a) Consider N identical spin 1/2 particles in a 1D harmonic oscillator potential $V = \frac{1}{2}m\omega^2x^2$. What are the ground state energy and the Fermi energy? (Your answers should be slightly different for N even and N odd!)

(b) Repeat for a 2D isotropic harmonic oscillator $V = \frac{1}{2}m\omega^2(x^2 + y^2)$ in the limit of large N .