PHYC 521: Graduate Quantum Mechanics I

Fall 2009

Homework Assignment #8

(Due November 16)

1- Exercise 10.2.3, Shankar, 2nd edition, page 260.

2- A spin-1/2 particle has two spin states $|+\rangle, |-\rangle$ available to it. Find the total number of allowed, distinct spin configurations of two and three spin-1/2 particles. How many symmetric and antisymmetric configurations are available in each case?

Repeat the problem for a spin-1 particle with three spin states $|+\rangle, |0\rangle, |-\rangle$.

3- Find the energy levels of a particle of mass m in a cubic box of volume L^3.

(a) What is the ground state energy of a system consisting of two identical spin-1/2 particles inside this box?

(b) Repeat part (a) for three identical spin-1/2 particles.
(Hint: spin-1/2 particles are fermions, thus their total wave function must be antisymmetric. Use the results of problem 2 for the spin part of the wavefunction.)