Phys 163; HW#8. Due Tues 10/31

1) Find the matrices Sx, Sy, and Sz for the spin-1 system. (They will be 3x3 matrices. Use the same procedure we used to find the 2x2 spin-1/2 matrices from section 4.4.)

2) Consider the state in problem 4.27.

A) Solve for the normalization constant A.

B) Find the expectation value $<S_x>$ using matrix multiplication.

C) Find the expectation value $<S_x>$ by explicitly working out the probability of each outcome, and summing over all possibilities.

D) Find the expectation value $<S_x>$ by rewriting S_x in terms of raising and lowering operators S+ and S-, and writing the state in terms of χ_+ and χ_-. (You know what the raising and lowering operators do to these states.)

3) Problem 4.30.

4) Use the results of problem 4.30 to solve the following problem:
   - On a spin-1/2 particle, you make a measurement of Sz, and get a positive answer. Next, you measure the spin angular momentum component in a direction 45 degrees from the z-axis. What might you get and with what probabilities?
   - Finally, compare your answers to the probabilities you would expect if you instead measured the spin angular momentum component in a direction 90 degrees from the z-axis. Does your 45-degree answer seem to split the difference, or does it seem strangely biased?