Phys 163, HW#7. Due Tues 10/24

1. Problem 3.27. Don't forget to take collapse into account! Part c) is tricky because you have to consider multiple ways that it could have collapsed, and the probabilities of each of those ways.

2. Problem A. 26 (in appendix), part (c) only. (But to do this, you will first have to find the eigenvalues. There will be a degeneracy!)

3. Problem 4.18. This will tell you how to keep the angular momentum states normalized properly as you raise and lower them with L+ and L-. Then proceed the same way we found the $\sqrt{n+1}$ and $\sqrt{n}$ factors we need when raising and lowering the harmonic oscillator, in class on Tuesday.

4. a) Show that the maximum possible value of Lz is always less than the magnitude of the angular momentum ($\sqrt{L^2}$).
b) Show that if you were able to raise the maximum-Lz state one more rung beyond the upper limit, the resulting value of Lz would always be *bigger* than the magnitude of the angular momentum. (Which wouldn't make any sense!)

5) a) If you measured the z-component of the orbital angular momentum and got $-3\hbar$, what are the possible values of ℓ?
b) If you measured the magnitude of the orbital angular momentum and got $\sqrt{20}\hbar$, what are the possible values of a subsequent measurement of Lz?
c) What is the smallest possible non-zero value you could get from a measurement of the magnitude of an object's angular momentum? (Hint: I'm not limiting you to orbital angular momentum for this problem.)