For Monday 10/22, read Griffiths' section 4.1.1 and turn in by 9:30 am:

1. Conceptual: What the limits of integration when you integrate over all space in spherical coordinates? Why?
2. Conceptual: Write the momentum operator in 3 dimensions in terms of unit vectors xhat, yhat, and zhat.
3. Conceptual: What variables can the potential energy in the schrodinger equation depend on (in other words, V in eq. 4.8 is generally a function of what)? Is equation 4.8 valid if *V* is a function of time? Why? Is equation 4.4 valid if *V* is a function of time? Why? In the derivation of equations 4.16 and 4.17 what is *V* a function of? What can't it be a function of?
4. Easy Math: Fill in any missing steps in the derivation of equations 4.16 and 4.17. Any questions?
5. Read problem 4.2. We will do this problem in class.
    a. Conceptual: Set up the problem. Where do you start?
    b. Math: How would the solution change if the box is not cubical? Say the particle is confined to: 0 < x < a and 0 < y < b and 0 < z < c.

For Wednesday 10/24, read Griffiths section 4.1.2 and turn in by 9:30 am:

6. Conceptual: What are the possible values of *m*? Why?
7. Conceptual: This time griffith's simply gives you the solution to a differential equation (4.26 solves 4.25). List some of the properties of these solutions.
8. Conceptual: Is equation 4.32 valid if *V* is a function of theta? Explain.
9. Easy math: Where does equation 4.30 come from? Explain.
10. Math: Use equations 4.27, 4.28, and 4.32 to construct $Y_1^0, Y_2^0,$ and Y_2^{-2}. Show that they are normalized and orthogonal. Show that they satisfy the differential equation 4.18.

"For realz" weekly homework due 9:30 am on Friday 10/26 is math problems from 10/19, 10/22 and 10/24.

For Friday 10/26, read Griffiths' section 4.1.3 and turn in by 9:30 am:

1. Conceptual: Mathematically, why doesn't the energy depend on *m*?
2. Conceptual: The solution to the infinite spherical well potential consists of Bessel functions (eq. 4.47). What happened to the Neumann functions?
3. Conceptual: What is meant by β_{nl}? Realistically, how would you solve for it?
4. Math: Consider $u(r) = Arj_2(kr)$.
    a. Show that it satisfies the differential equation 4.41 with *l*=2.
    b. Make a plot of this function.
    c. Where is the first place the function goes to zero where *x*>0?
    d. What is *n*? What does this mean for *k*? What is the energy in terms of $\hbar$, *m*, and *a*?