General

1. The exam will cover all material from problem set 5 to problem set 11.
2. You may bring a full page of formulas (front and back).
3. There is a formula sheet on the web site. But you may NOT use this on the exam.
4. The practice exams are a good way to study. BUT THE PRACTICE EXAM IS NOT COMPREHENSIVE. i.e. there is more stuff that we covered which could appear on the exam that is not on the practice exam. Not all of the material on the practice exam is guaranteed to appear.
5. THE HOMEWORK IS COMPREHENSIVE. If you can do it all you will be prepared. All solutions are online. My intent is that nothing on the exam should be unfamiliar.

Subject and Problems

1. Everything from the second exam. see guide to second exam.
2. For three dimensionsional with a spherically symmetric potential $V(r)$ – this concerns the radial part. HW10, HW11
   (a) Know what the radial schrodinger equation is. Be able to graph the effective potential and qualitatively sketch the solutions (i.e. $u_{n\ell}$ or R_{nl}) for different n, ℓ. Be able to show that this or that wave function satisfies the radial Schrödinger Equation HW 10,HW11
   (b) Know how the radial probability distribution $P(r)dr$ is related to u_{nl} and R_{nl} and be able to graph for the wave functions of hydrogen. Be able to calculate various quantities like the average potenial energy, average radius, variance in radius, most likely radius. HW10,HW11
3. Understand the classical dynamics associated with hydrogen orbitals. Use this understanding to predict the inflection points. HW11
4. Hydrogen wave function and the periodic table. HW11
   (a) Be able to list the electronic structure of an element given the atomic number Z. Be able to explain the basic properties of the periodic table, e.g. atoms with closed shells are inert, while atoms with one extra electron are reactive. HW11
   (b) Know how the energies, squared angular momentum momentum, and component of z angular momentum is related to the quantum numbers n, ℓ, m
   (c) For a given n be able to list the allowed values of ℓ and m etc.