Physics 472 – Spring 2008

Homework #1, due Friday, January 18
[Point values are in square brackets.]

1. [10] Redo the entire final exam from Physics 471. When you do the last problem, take full advantage of the spatial symmetry in parts (d) and (e). If you think hard about what you are doing, you'll realize that you don't have to carry out any integrals over the range $a/2 < x < a$.

2. [2] In class I showed how to estimate the ground state energy of the hydrogen atom from the Uncertainty Principle. Do the same thing for the 1-dimensional harmonic oscillator. This is one problem (maybe the only one) where you can obtain the exact answer from the Uncertainty Principle without cheating. The reasons are that the kinetic and potential energies are both quadratic functions of x or p, and the ground state wavefunction has a Gaussian shape with minimal uncertainty.

3. [4] Griffiths problem 4.27.

4. [4] Griffiths problem 4.29.