

# Physics 472 – Spring 2010

## Homework #1, due Friday, January 16

[Point values are in square brackets.]

1. [10] Redo the entire final exam from Physics 471.
2. [2] Last semester 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.