UCSD Physics 130b   *Quantum Mechanics*   Assignment 1

Prof. B. Keating   Assigned: October 12, 2012   Due: October 19, 2012: in Class

LATE HOMEWORK INCURS -10%/WEEKDAY LATE, UP TO 50% MAXIMUM

$\boxed{1}$ Griffiths Problem 5.1 : Two particles become one. Explain how we implicitly used the results of this problem for our first encounter with perturbing the Hydrogen atom.

$\boxed{2}$ Griffiths Problem 6.2 : Harmonic Oscillator. Part c: plot the first two wavefunctions, ground state and the first excited state, (by hand) superimposed upon the unperturbed wavefunctions. Use your own best judgement for all constants you may need.

$\boxed{3}$ Griffiths Problem 6.8

$\boxed{4}$ Hydrogen

- **(a)** Construct the wave function for Hydrogen in the state with $n = 3, \ell = 2, m = 1$; make sure it is normalized properly.

- **(b)** Can an electron transition from the state in part **(a)** to a state with $n = 1, \ell = 0, m = 0$? If so, what is the energy released or absorbed when the transition occurs? If not, why not?