Chemistry 474b 2007
Problem Set #2 (Due Wednesday, Tuesday 30, 2007)

1.) Consider a particle of mass m in an infinite square well that extends from x = 0 to x = L. Suppose that the potential is perturbed by an extra potential (see the figure)

$$\hat{H}' = -V_o \quad for\ x \leq L/2$$

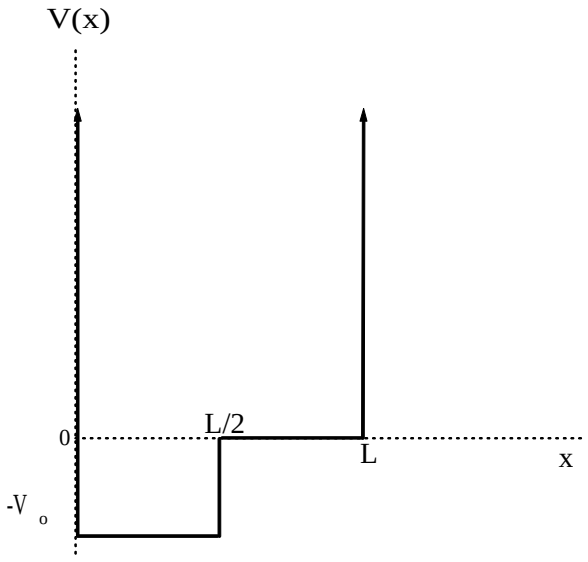
$$\hat{H}' = 0 \quad for\ x > L/2$$

where V_o is a constant.

a) What is the first order correction to the energy eigenvalue of the lowest energy state, n = 1?

b) Evaluate expressions for the first four terms to the first order correction to the wave function for n = 1. (Some may be zero in magnitude).

Note: Use the well known wave functions for the particle in a box, and their associated energy eigenvalues to solve this problem. Look up any integrals you need. The CRC Handbook of Chemistry and Physics is a good reference.



An infinite potential well with a perturbation - V_o