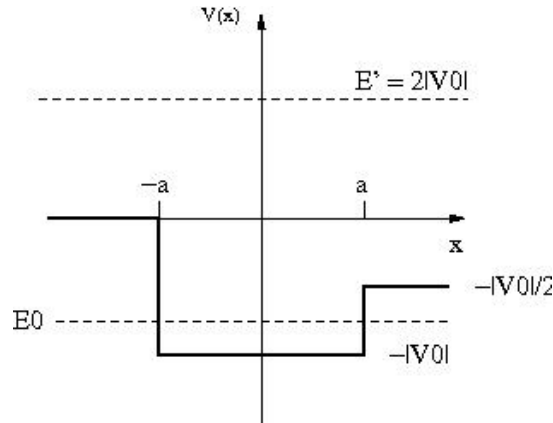**Physics 401 - Homework #11 - Due Wednesday December 2nd**

1) **An asymmetric finite potential well.** Consider the asymmetric finite potential well shown below:

a) (three points) Suppose that there exists a ground state with energy E0 as labeled in the figure. Make a rough sketch of what you expect the ground state wavefunction to look like (no calculation is necessary), and indicate whether the function is even, odd, or neither.

b) (one points) How would the ground state wavefunction be altered if the potential were infinite for $(x < -a)$, instead of being zero as shown in the figure? (You may either make a sketch of the new wavefunction or just describe how it changes.)

c) (three points) There exists a free particle state (a scattering state) with energy E' = 2|V0|. Make a plot of the DeBroglie wavelength of this state as a function of (x).

d) (one point) Suppose that the energy E' is such that two DeBroglie wavelengths fit exactly inside the well between $(x = -a)$ and $(x = a)$. What do you expect the transmission coefficient to be for this state?

2) **A double potential well.** (six points total) Consider the double potential well shown in the figure below. Suppose that the depth and width of the wells allows for three bound states. Make a rough sketch of what these bound state wavefunctions should look like, and indicate for each whether the function is even, odd, or neither. On your sketch, indicate the locations x = {-b, -a, a, and b}.