LAM **Engineering 73** **assigned 9.17.2023**
Lab 1 **due 9.27.2023**

Computer Simulations of Quantum Mechanical Problems

1. Barrier Potential

$$V(x) = \begin{cases} V_0; & 0 < x < a \\ 0; & x < 0, x > a \end{cases}$$

Plot the probability of finding a particle incident from the left in the following two cases.

a. $E = \frac{V_0}{2}$

b. $E = 2V_0$

2. Potential Well

$$V(x) = \begin{cases} 0\,; & 0 < x < a \\ V_0; & x < 0, x > a \end{cases}$$

Plot the probability as a function of x of finding a particle if it is:

a. located in the potential well, with V_0 large enough that 100 allowed energy levels exist within the well; plot the probability as a function of x of finding the particle if n = 1, 20, 50, 100.

b. incident from the left, with $E = 2V_0$ (keep V_0 as in part a).

3. Simple Harmonic Oscillator; Infinite Potential

Using the formulas for the wavefunctions given in Eisberg and Resnick, plot the probability as a function of x of finding the particle within the well for several energy levels, with the highest energy level (or highest few energy levels) showing a distribution approaching the classical limit.