

1) Find the energy levels and wavefunctions of a particle moving in a one dimensional box described by the potential <sup>energy</sup> function

$$V(x) = 0, \quad -L < x < +L$$

$$= \infty, \quad x > L, \quad x < -L$$

2) A particle trapped in one dimensional box whose length is  $L$ . Its energy is  $\frac{\pi^2 \hbar^2}{2mL^2}$ , where in the box, is the particle most likely to be found?

3) The ground state of a linear harmonic of angular frequency  $\omega$  is represented by

$$\psi(x) = \left(\frac{m\omega}{\pi\hbar}\right)^{1/4} e^{-m\omega x^2/2\hbar}$$

What are the expectation values of the position and momentum in the said state?

4) Consider a particle of mass  $9.1 \times 10^{-31}$  kg and energy  $E = 342$  eV confined in a one dimensional box of length  $10^{-10}$  m. Calculate (a) the quantum no.  $n$  of this state of the system and (b) the energy required to take the system to its next excited state.