Problems 2

1. Consider an electron in a 1D box, in energy eigenstate $\psi_n(x)$.

a. Determine an expression for the probability that the electron is found to be within the interval, $(\frac{2}{5}L, \frac{3}{5}L)$?

b. Evaluate your expression for $n = 1$ and 2.

2. Suppose that the particle in a 1D box is in the state,

$$\psi(x) = Ax(L - x).$$

a. Determine real positive A such that $\psi(x)$ is normalized.

b. Expand $\psi(x)$ as a sum over energy eigenstates - i.e., find the coefficients in the expansion.

c. What is the probability that the energy of the particle in state $\psi(x)$ is measured to be $E_3 = 9\hbar^2\pi^2/(2m)$?