

ECE 462 - Homework #3

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1 Problem 2.1.3

The particle's position is dependent upon its energy state. The only certainty we have of the particle's position is that it does not exist at the boundary conditions. The higher order the particle's state, the more *nodes* the function is likely to exist at (peaks in the square of the particle's distribution center).

To quantitatively determine the particle's position, this can be evaluated with:

$$\Psi(x)^2$$

2 Problem 2.1.6

If the floor of the infinite well is set to 3eV instead of 0, then the frequency of the ground-level oscillation would change to reflect this higher energy level. This would directly result in a lower "revival" time (i.e. faster oscillation).

3 Problem 2.2.3

$$\Psi = \sum_n c_n \phi_n, \text{ or } \Psi = \sum_n d_n \theta_n$$

3.1 Part (a)

$$\langle E \rangle = c_1^2 \phi_1 + c_2^2 \phi_2$$

3.2 Part (b)

Take inner product of θ_m :

$$d_k = c_1 \langle \phi_1 | \theta_k \rangle + c_2 \langle \phi_2 | \theta_k \rangle$$

$$\Psi_0 = c_1 \langle \phi_1 | \theta_k \rangle + c_2 \langle \phi_2 | \theta_k \rangle$$