

1 Quantum Review - A summary

1. (Can use a computer) A particle in an **infinite square well** has the initial wave function:

$$\psi(x) = \psi(x, 0) = Ax^2(a - x) \quad (1)$$

1. Normalize the wavefunction.
2. Plot the wavefunction. If you were guessing, which energy eigenstates would you say are most dominant in this wavefunction. (i.e. which c_n are biggest?)
3. Find the coefficients c_n .
4. Find the expectation value of energy $\langle E \rangle$.
5. Find $\psi(x, t)$ and use Mathematica's **Manipulate** function to make a movie of it.

2. (Can be done by hand) A particle in an **infinite square well** has the initial wavefunction

$$\psi(x) = \sqrt{\frac{2}{a}} \frac{3 \sin(\frac{2\pi x}{a}) + 5 \sin(\frac{4\pi x}{a}) + 4 \sin(\frac{5\pi x}{a})}{\sqrt{45}} \quad (2)$$

1. Is the wavefunction normalized? If not, how would you modify the function so it is normalized?
2. Plot the wavefunction.
3. Find the coefficients c_n .
4. Find the expectation value of energy $\langle E \rangle$.
5. Find $\psi(x, t)$ and use Mathematica's **Manipulate** function to make a movie of it.