

# 1 Particle in a Box

In this section we want to study the wavefunctions and energies associate with the ‘particle in a box’ model.

## 1.1 Important Files

- box\_wavefunctions.c
- box\_wavefn\_XX (where XX is the number of the file)
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## 1.2 Methods

First we wanted to calculate the analytical results for a particle in a box as a reference.

Both the energy and the wavefunctions (within the box, zero outside) for this system are well known for and given by:

$$E_n = \frac{n^2 \pi^2 \hbar^2}{2mL}; \quad n = 1, 2, 3, \dots$$
$$\psi_n = \frac{\sqrt{2}}{L} \sin(k_n x); \quad n = 1, 2, 3, \dots$$