1 Fourier Series for the Ground State of a Particle-in-a-Box.

Treat the ground state of a quantum particle-in-a-box as a periodic function.

(a) Suppose you want to expand this ground state in a Fourier series. As a first step, set up the integrals for the Fourier coefficients.

(b) Now do some sensemaking. Which terms will have the largest coefficients? Explain briefly.

(c) More sensemaking: Are there any coefficients that you know will be zero? Explain briefly.

(d) Now calculate: Using the technology of your choice or by hand, calculate the four largest coefficients. With screen shots or otherwise, show your work.

(e) Using the technology of your choice, plot the ground state and your approximation on the same axes.