PH 451 **Winter 2026**

Worksheet #2

Wednesday, January 7, 2026

Name:

Questions (5 pts):

Consider a particle in an infinite potential well (V = 0 for 0<x<L and V = ∞ elsewhere). As you know, the eigenfunctions of the Hamiltonian for this system are given by (at 0<x<L)

$$\varphi_n(x) = \sqrt{\frac{2}{L}} sin\left(\frac{\pi n x}{L}\right)$$

The particle is in a state described by some (normalized) wave function ψ(x).

Write down the integrals you would need to take to calculate the following:

(a) The probability of finding the particle somewhere between 0 and L/2

(b) The coefficients c_n if you present ψ(x) as a superposition of eigenfunctions $\varphi_n(x)$, i.e. $\psi(x) = \sum_n c_n \varphi_n(x)$

(c) **If you have time**: You make a measurement of energy. What are the possible outcomes of the measurement? How do you decide which outcomes are likely or unlikely?