Phys 551 **Winter 2026**

Worksheet #7

(Wednesday, January 21, 2026)

Name

Questions (5 pts):

A quantum harmonic oscillator is in a state described by the following wavefunction: $\Psi(x) = 1/\sqrt{2}\,(\varphi_0(x) + \varphi_1(x))$, where $\varphi_n(x)$ are eigenfunctions of the Hamiltonian.

(a) If energy is measured, what are the outcomes and their probabilities?

(b) What is the expectation value of energy? Argue that your result makes sense.

(c) What is the time-evolved state $\Psi(x,t)$? Does the energy expectation value change with time?