9.7: Particle in a Slanted Well Potential

Numerical Solutions for Schrödinger's Equation for the Particle in the Slanted Box

Parameters go here: $x_{max} = 1$ $\mu = 1$ $V_0 = 2$

Potential energy $V(x) = V_0 x$

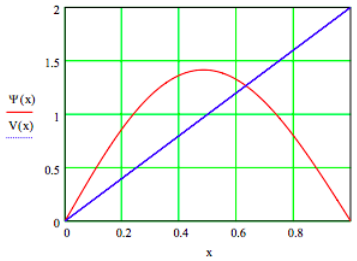
Given

$$\frac{-1}{2\mu}\frac{d^2}{dx^2}\psi(x) + V(x)\psi(x) = E\psi(x)$$

with these boundary conditions: $\psi(0) = 0$ and $\psi'(0) = 0.1$

$\psi = Odesolve(x, x_{max})$ Normalize wavefunction: $\psi(x) = \frac{\psi(x)}{\sqrt{\int_0^{x_{max}} \psi(x)^2 dx}}$

Enter energy guess: E = 5.925



Calculate most probably position: x = 0.5 Given $\frac{d}{dx}\psi(x) = 0$ Find (x) = 0.485

Calculate average position: $X_{avg} = \int_0^1 \psi(x)(x)\psi(x)dx$ $X_{avg} = 0.491$

Calculate potential and kinetic energy:

$V_{avg} = V_0 X_{avg}$ $V_{avg} = 0.983$

$T_{avg} = E - V_{avg}$ $T_{avg} = 4.942$