Numerical Solutions to Schrodinger's Equation for the Particle in the Semi-infinite Box

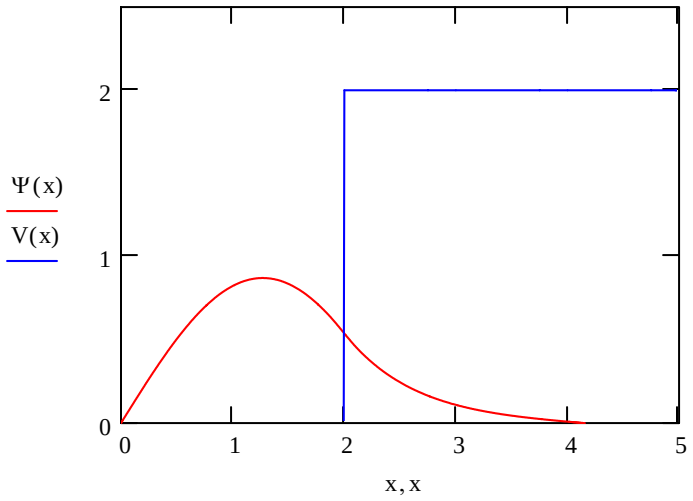
Parameters go here: $x_{min} := 0$ $x_{max} := 5$ $m := 1$ $V_0 := 2$ $lb := 2$

Potential energy $V(x) := \text{if}\left[(x \geq lb), V_0, 0\right]$

Given $\frac{d^2}{dx^2}\Psi(x) = 2 \cdot m \cdot (V(x) - E) \cdot \Psi(x)$ $\Psi\left(x_{min}\right) = 0$ $\Psi'(0) = 0.1$

$\Psi := \text{Odesolve}\left(x, x_{max}\right)$ $\Psi(x) := \dfrac{\Psi(x)}{\sqrt{\int_{x_{min}}^{x_{max}} \Psi(x)^2 \, dx}}$

Enter energy guess: $E \equiv 0.766$



Calculate the probability that the particle is in the barrier: $\int_2^5 \Psi(x)^2 \, dx = 0.092$

Calculate the probability that the particle is not in the barrier: $\int_0^2 \Psi(x)^2 \, dx = 0.908$

Calculate and display momentum distribution:

Fourier transform: $p := -10, -9.9 .. 10$ $\Phi(p) := \int_{-x_{min}}^{x_{max}} \exp(-i \cdot p \cdot x) \cdot \Psi(x)\, dx$