

9.2: Particle in an Infinite Potential Well

Numerical Solutions for Schrödinger's Equation

Integration limit: $x_{\max} := 1$ Effective mass: $\mu := 1$

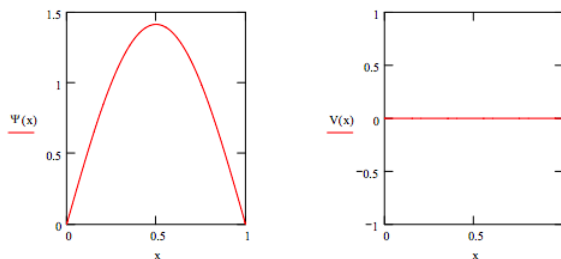
Potential energy: $V(x) := 0$

Numerical integration of Schrödinger's equation:

Given: $\frac{1}{2\mu} \frac{d^2}{dx^2} \Psi(x) + V(x)\Psi(x) = E\Psi(x)$ $\Psi(0) = 0$ $\Psi'(0) = 0.1$

$\Psi := \text{Odesolve}(x, x_{\max})$ Normalize wave function: $\Psi(x) := \frac{\Psi(x)}{\sqrt{\int_0^{x_{\max}} \Psi(x)^2 dx}}$

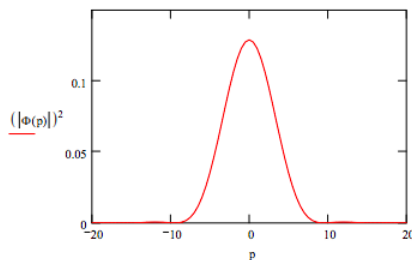
Enter energy guess: $E = 4.934$



Fourier transform coordinate wave function into momentum space:

$p := -20, -19.5 \dots 20$

$$\Phi(p) := \frac{1}{2\mu} \int_0^{x_{\max}} \exp(-i \cdot p \cdot x) \cdot \Psi(x) dx$$



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