Numerical Solutions for Schrodinger's Equation

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

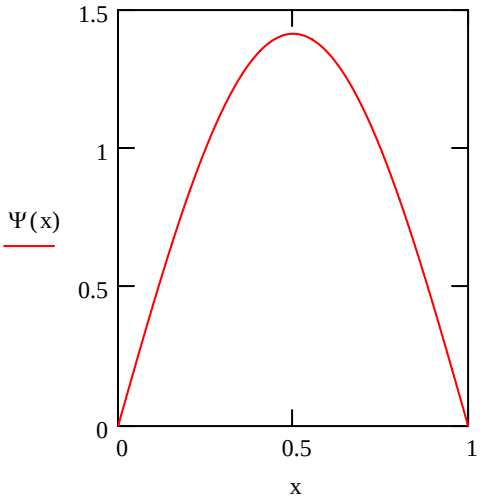
Potential energy: $V(x) := 0$

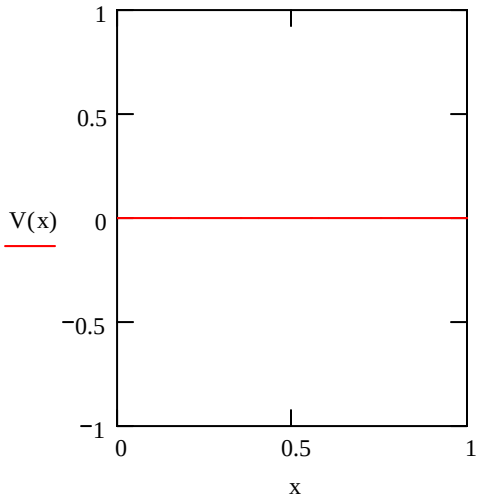
Numerical integration of Schrodinger's equation:

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

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

Enter energy guess: $E \equiv 4.934$





Fourier transform coordinate wave function into momentum space.

$p := -20, -19.5 .. 20$ $\Phi(p) := \frac{1}{\sqrt{2\cdot\pi}}\cdot\int_0^{x_{max}} \exp(-i\cdot p\cdot x)\cdot\Psi(x)\, dx$