Numerical Solutions for Schrodinger's Equation
Particle in a Box with Multiple Internal Barriers

Integration limit: $x_{max} := 1$ Effective mass: $\mu := 1$ Barrier height: $V_0 := 100$

Potential energy:
$$V(x) := \begin{cases} V_0 & \text{if } (x \ge .185)\cdot(x \le .215) + (x \ge .385)\cdot(x \le .415) + (x \ge .585)\cdot(x \le .615) + (x \ge .785)\cdot(x \le .815) \\ 0 & \text{otherwise} \end{cases}$$

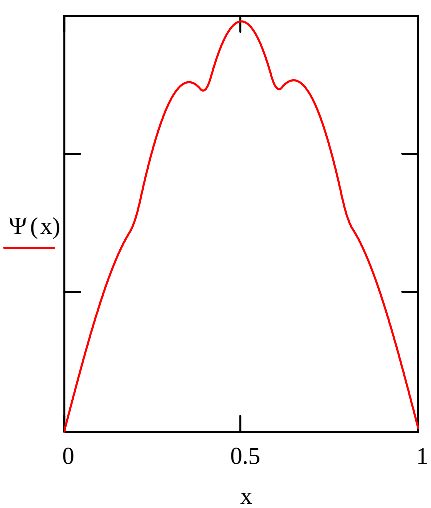
Numerical integration of Schrodinger's equation:

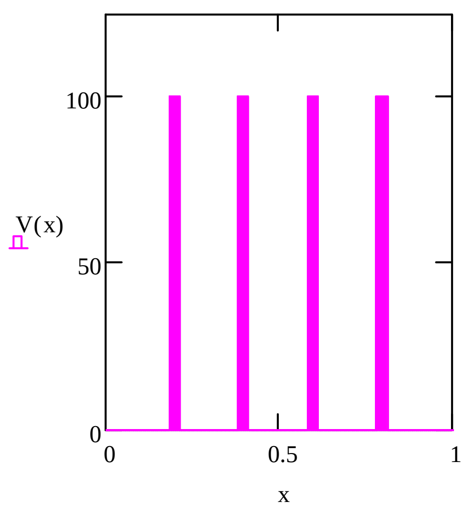
Given
$$\frac{-1}{2\cdot\mu}\cdot\frac{d^2}{dx^2}\Psi(x) + V(x)\cdot\Psi(x) = E\cdot\Psi(x) \qquad \Psi(0) = 0 \qquad \Psi'(0) = 0.1$$

$$\Psi := \text{Odesolve}(x, x_{max})$$

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

Enter energy guess: $E \equiv 18.85$





Calculate kinetic energy:
$$T := \int_0^1 \Psi(x)\cdot\frac{-1}{2}\cdot\frac{d^2}{dx^2}\Psi(x)\,dx \qquad T = 5.926$$

Calculate potential energy:
$$V := E - T \qquad V = 12.924$$

Tunneling probability:
$$\frac{V}{V_0} = 12.924\,\%$$