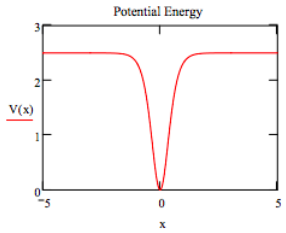
10.34: Numerical Solution for the Feshbach Potential

Parameters go here: x_{max} = 5 m = 1 V_0 = 2.5 μ = 0 d = .5

Potential energy:

$$V(x) = V_0 tanh\left(\frac{x}{d}\right)^2$$



Given:

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

$$\psi(-x_{max} = 0 \;\; \psi\left(-x_{max}\right) = 0.1$$

$$\psi = Odesolve(x, x_{max})$$

Normalize wavefunction:

$$\psi(x) = \frac{\psi(x)}{\sqrt{\int_0^{x_{max}} \psi(x)^2 dx}}$$

Enter energy guess: E = 1.44949