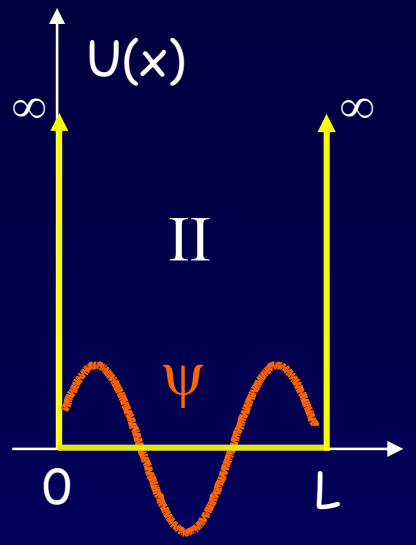
Particle in a Box (2)



Region II: When U = 0, what is $\psi(x)$?

$$\frac{d^2\psi(x)}{dx^2} + \frac{2m}{\hbar^2}(E-U)\psi(x) = 0$$

$$\frac{d^2\psi(x)}{dx^2} = -\left(\frac{2mE}{\hbar^2}\right)\psi(x)$$

The general solution is a superposition of sin and cos:

$$\psi(x) = B_1 \sin kx + B_2 \cos kx \quad \text{where, } k = \frac{2\pi}{\lambda}$$

Remember that k and E are related:

$$E = \frac{p^2}{2m} = \frac{\hbar^2 k^2}{2m} = \frac{h^2}{2m\lambda^2}$$

because U = 0

B_1 and B_2 are coefficients to be determined by the boundary conditions.