

BC

$$u=0 \text{ at } x=0, x=L$$

$$X(x)T(t)=0 \text{ at } x=0, x=L$$

$$T(t) \neq 0 \text{ or } T(0) \neq 0$$

$$X(x)=0 \text{ at } x=0, x=L$$

$$X(0)=0, X(L)=0$$

$$\text{BVP} \begin{cases} X'' + \lambda X = 0 \\ X(0)=0, X(L)=0 \end{cases}$$

↓
Solve by ODE
Methods, 3 Cases

THEOREM

$$X = C_2 \sin(\sqrt{\lambda} \frac{x}{L})$$

$$\begin{cases} T' + k\lambda T = 0 \\ T(0) \neq 0 \end{cases} \quad \text{IVP}$$

$$T = \frac{\text{const}}{\text{integ factor}}$$

$$T = T(0) e^{-k\lambda t}$$