Assume: $y_j(x,t) = X(x)T(t)$

(i) $\Rightarrow X(x)T''(t) = c^2 X''(x)T(t)$

$\Rightarrow \frac{T''(t)}{c^2 T(t)} = \frac{X''(x)}{X(x)} = -\lambda$

Solve: $\begin{cases} X'' = -\lambda X \\ X(0) = X(L) = 0 \end{cases}$

Saw: non-trivial sols exist only when $\lambda = \left(\frac{n\pi}{L}\right)^2$

$X(x) = \sin\left(\frac{n\pi}{L}x\right)$

(ii) $\Rightarrow X(0)T(t) = X(L)T(t) = 0$ for $t > 0$

$T \not\equiv 0$

$X(0) = X(L) = 0$.

Solve 'Pr. A w/ sep. of variables'.

Want: $y_A(x,t) = \sum_{j=1}^{\infty} a_j y_j(x,t)$

Here: y_j : building blocks

Want: $\begin{cases} \partial_t^2 y_j = c^2 \partial_x^2 y_j & \text{(i)} \\ y_j(0,t) = y(L,t) = 0 & \text{(ii)} \\ \partial_t y_j(x,0) = 0 & \text{(iii)} \end{cases}$