

Ex: $y_{tt} = \frac{1}{4} y_{xx}$
 $0 \leq x \leq 2$
 $y(0,t) = y(2,t) = 0$
 $y(x,0) = 0$
 $y(x,1) = \cos(\pi x)$

Find F. sine series of $f(x)$.

Soln:

$$A_n = \frac{2}{L} \int_0^L \sin(n\pi x) \cdot \cos(\pi x) dx$$

$$= \sum_{n=1}^{\infty} A_n \cos\left(\frac{n\pi x}{L}\right) \sin\left(\frac{n\pi x}{L}\right)$$

$$A_n = \frac{2}{L} \int_0^L f(x) \sin\left(\frac{n\pi x}{L}\right) dx$$

Short cut:
 $f(x) = \frac{1}{2} \sin(2\pi x)$

