5) PDE) 1 dim WE $u_{xx} = u_{tt}$

BC) $u(0,t) = 0 \quad u(\pi,t) = 0$

IC) $u(x,0)$

$$\frac{du}{dt} = \sin x$$

Answer: $\sin x \sin t$

if IC) $u(x,0) = \sum_{n=1}^{\infty} \frac{1}{n^{48+1}} \sin(nx)$

$$\left.\frac{du}{dt}\right|_{t=0} = 0$$

Answer: $\sum_{n=1}^{\infty} \frac{1}{n^{48+1}} \sin(nx)\cos(nt)$

The IC is already a Fourier sine series: we don't need to "find" it.