

EXERCISES, Week 14 (submit by 31.01.2018)

Use the Fourier method to solve the following initial-boundary value problems:

1.

$$\begin{cases} u_{tt} = 4u_{xx} & 0 < x < 1, t > 0 \\ u(x, 0) = \sin \pi x & 0 \leq x \leq 1 \\ u_t(x, 0) = 0 & 0 \leq x \leq 1 \\ u(0, t) = u(1, t) = 0 & t \geq 0. \end{cases}$$

2.

$$\begin{cases} u_{tt} = a^2 u_{xx} + \sin \omega t & 0 < x < 1, t > 0 \\ u(x, 0) = u_t(x, 0) = 0 & 0 \leq x \leq 1 \\ u(0, t) = u(1, t) = 0 & t \geq 0. \end{cases}$$

3.

$$\begin{cases} u_t = u_{xx} & 0 < x < 1, t > 0 \\ u(x, 0) = \sin \pi x & 0 \leq x \leq 1 \\ u(0, t) = u(1, t) = 0 & t \geq 0. \end{cases}$$

4.

$$\begin{cases} u_t = u_{xx} + t & 0 < x < 1, t > 0 \\ u(x, 0) = 0 & 0 \leq x \leq 1 \\ u(0, t) = u(1, t) = 0 & t \geq 0. \end{cases}$$