

Homework 4

1. Consider an elastic string of length 4 whose ends are held fixed. The string is set in motion with no initial velocity from an initial position $u(x, 0) = \sin x$. Find $u(x, t)$ (Assume $a = 1$.)

2. Consider an elastic string of length 10 whose ends are held fixed. The string is set in motion with no initial velocity from an initial position $u(x, 0) = f(x)$, where

$$f(x) = \begin{cases} x/5 & \text{if } 0 \leq x \leq 5, \\ (10 - x)/5 & \text{if } 5 < x \leq 10. \end{cases}$$

Find $u(x, t)$ (Assume $a = 1$.)

3. Consider an elastic string of length 4 whose ends are held fixed. The string is set in motion from the equilibrium position with an initial velocity of $u_t(x, 0) = g(x)$, where

$$g(x) = \begin{cases} 0 & \text{if } 0 \leq x \leq 1, \\ 1 & \text{if } 1 \leq x \leq 3, \\ 0 & \text{if } 3 \leq x \leq 4. \end{cases}$$

Find $u(x, t)$. (Assume $a = 1$.)