

MAE/MSE 502, Spring 2023 HW4 Solution

Problem 1

$$u(x, t) = te^{-2t} \sin(x) + e^{-11t} \sin(2x)$$

Problem 2

$$u(x, t) = \sin(t) + \sin(x) + [1 - \cos(t)] \cos(x)$$

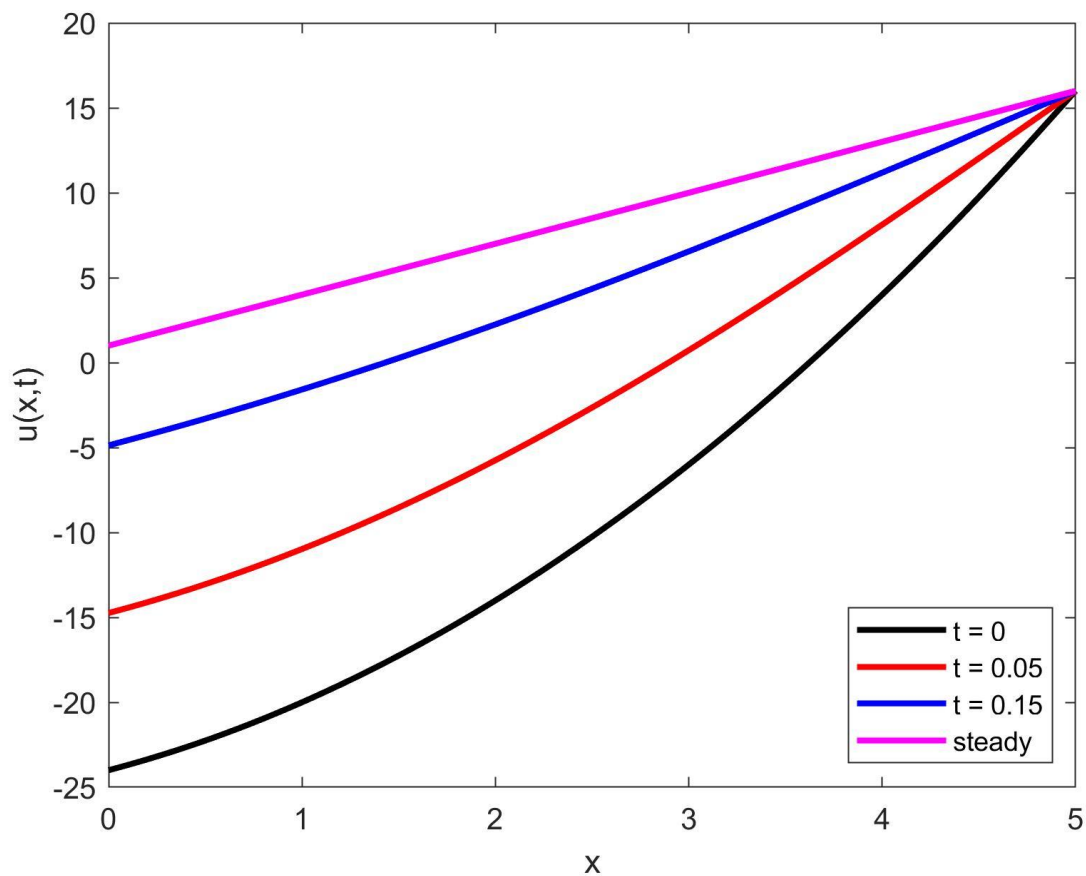
Problem 3

$$u(x, t) = (3x + 1) + \sum_{n=1}^{\infty} a_n \cos\left(\frac{n\pi x}{10}\right) e^{-(n\pi)^2 t},$$

where the summation goes over only odd values of  $n$ , and

$$a_n = \frac{2}{5} \int_0^5 (x^2 - 25) \cos\left(\frac{n\pi x}{10}\right) dx.$$

Plot:



Problem 4

$$u(x,t) = \sin(\pi x)(e^{-\pi^2 t} - 1) + 1 - 2x^2$$

Plot:

