

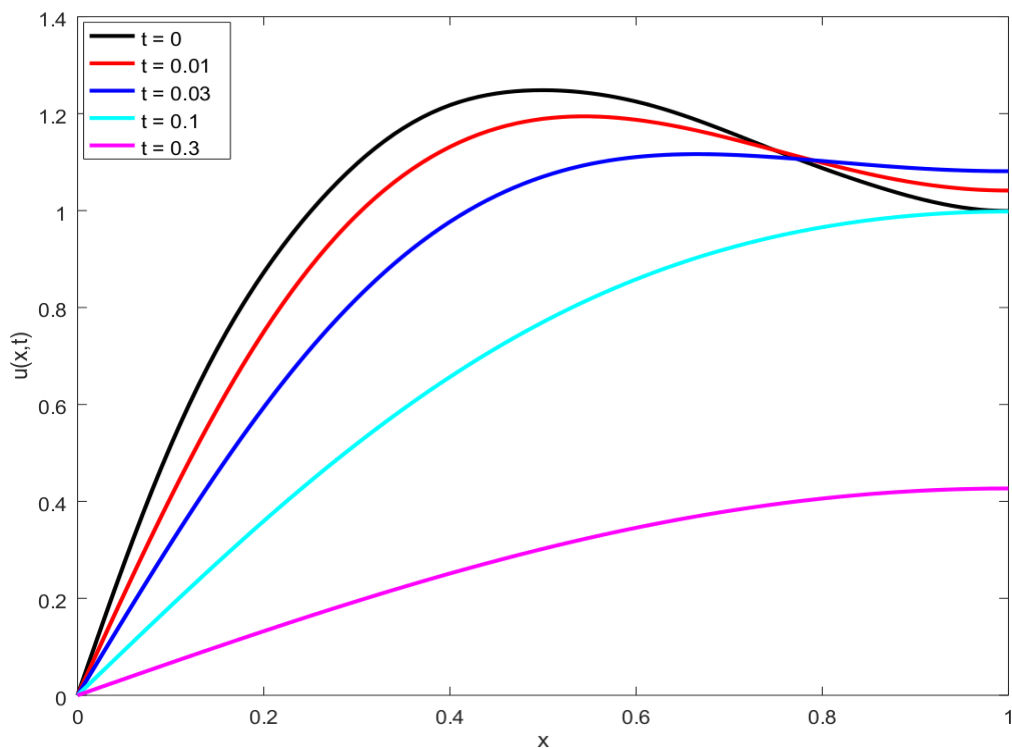
Prob 1.

$$u(x, t) = \sum_{n=1}^{\infty} a_n \sin\left(\frac{n\pi x}{2}\right) \exp\left(-\left(\frac{n\pi}{2}\right)^2 t - 5t^2\right),$$

where the summation is over the terms with odd values of n only, and

$$a_n = \frac{\int_0^1 (4x^3 - 9x^2 + 6x) \sin\left(\frac{n\pi x}{2}\right) dx}{\int_0^1 \left[\sin\left(\frac{n\pi x}{2}\right)\right]^2 dx} = 2 \int_0^1 (4x^3 - 9x^2 + 6x) \sin\left(\frac{n\pi x}{2}\right) dx, \text{ for odd } n.$$

Plot (with the infinite series truncated inclusively at $n = 15$):



Prob 2

$$u(x, t) = \frac{6}{t+2} + \left(\frac{2}{t+2}\right)^{4\pi^2+1} \cos(2\pi x)$$

Prob 3

$$E(t) = \left(\frac{5}{6} + 2t\right) \exp\left(-\frac{t^2}{2}\right), \quad E(1) = \frac{17}{6} \exp\left(-\frac{1}{2}\right)$$

Prob 4: will be discussed in class.