ELCT 222
Quiz 19

Instructions: Please show ALL work and use clear English to explain methods of solution. Unclear or illegible work will not receive full credit.

Honor Pledge: All work on this quiz is my own, and I have not received any unauthorized aid.

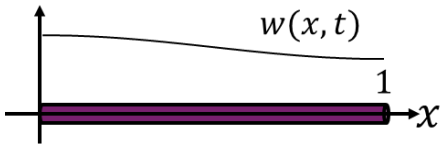
Signature:_____

(No signature will result in zero score.)

Applications of Laplace transform

Consider a rod of length 1 meter. Suppose that the initial temperature of the rod is $w(x,0^-) = 90 + \cos(\pi x) + \cos(2\pi x)$, $x \in [0,1]$ and $w(x,t)$ follows the relation below:

$$\frac{dw(x,t)}{dt} = \frac{d^2w(x,t)}{dx^2}$$



with the boundary condition given by $\frac{dw(x,t)}{dx}\,|_{x=0,x=1} = 0$.

1. (50 pts) Determine how the temperature changes over time, i.e., $w(x,t)$ (Hint: Exploit the linearity of the system)
2. (20 pts) Determine $\lim_{t\to\infty} w(x,t)$.
3. (30 pts) Plot how temperature changes over time for $t \in [0,0.1]$ seconds in MATLAB.