

Math 308 Quiz 7

Due: Friday, March 22, 2024

Name: _____ UIN: _____

Directions: Please upload a PDF file of your solutions on Gradescope by Friday 22 March at 10pm. You may discuss in groups but please submit your own work.

1. (a) (5 points) Use Laplace transformations to solve the initial value problem

$$y'' + 4y = 2\delta(t - 1) - 8\delta(t - 2), \quad y(0) = 1, \quad y'(0) = 0$$

- (b) (5 points) Find the Laplace transform of $f(t)$

$$f(t) = \begin{cases} t, & 0 \leq t < 1, \\ 1, & 1 \leq t < 2, \\ 3 - t, & 2 \leq t < 3, \\ 0, & t \geq 3 \end{cases}$$

2. (5 points) Use Laplace transforms to solve the initial value problem

$$y'' + 4y' + 13y = f(t), \quad y(0) = 0, \quad y'(0) = 0.$$

$$\text{where } f(t) = \begin{cases} 1, & 0 \leq t < 1, \\ 2, & t \geq 1. \end{cases}$$

3. (5 points) Use Laplace transforms to solve the integral equation

$$h(t) - 4e^{-2t} = \cos t - \int_0^t \sin(t-x)h(x) \, dx$$