

MATH 308 Homework 10 solutions

10.1. Find the Laplace transform of the function

$$t^5 e^{2t}.$$

10.2. Use the Laplace transform to solve the initial value problem

$$y'' - 4y' + 4y = 0; \quad y(0) = 1, \quad y'(0) = 1.$$

10.3. Use the Laplace transform to solve the initial value problem

$$\mathbf{y}' = \begin{pmatrix} 5 & -2 \\ 6 & -2 \end{pmatrix} \mathbf{y}, \quad \mathbf{y}(0) = \begin{pmatrix} 1 \\ 0 \end{pmatrix}.$$

10.4. Find the solution of the initial value problem

$$y'' + 4y = u_\pi(t) - u_{3\pi}(t); \quad y(0) = 0, \quad y'(0) = 0.$$

10.5. Find the solution of the initial value problem

$$y'' + 4y = \delta(t - \pi) - \delta(t - 2\pi); \quad y(0) = 0, \quad y'(0) = 0.$$

10.6. Find the general solution of the system

$$\mathbf{x}' = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 2 & 1 \\ 2 & 1 & 1 \end{pmatrix} \mathbf{x}.$$

10.7. Find the matrix e^{At} , where

$$A = \begin{pmatrix} 3 & -2 \\ 2 & -2 \end{pmatrix}.$$