
WINTER SEMESTER 2018-2019

MAT2002 – Applications of Differential and Difference Equations

Digital Assignment II – Moodle upload on 1.03.2019

Class Nbr : 2305 ; Slot : E1+TE1

1. Solve the Legendre's linear equation $(3x-1)^2 y'' + (3x-1)y' + y = 4\sin(\ln(3x-1))$.

2. Solve the following initial-value problems using Laplace transform method.

(i) $y'' + y = 4\delta(t - 2\pi)$ with $y(0) = 1, y'(0) = 0$

(ii) $y' + 2y = 2[u(t) - u(t - 1)]$ given $y(0) = 0$

3. Convert the second order linear differential equation $y'' + 4y' + 3y = 10\sin t$ into a first order linear system of the form $X' = AX + b(t)$.

4. Find the general solution to the following system using matrix diagonalization.

$$X' = AX + b, \text{ where } X = \begin{bmatrix} x(t) \\ y(t) \end{bmatrix}, A = \begin{bmatrix} -5 & 1 \\ 4 & 2 \end{bmatrix} \text{ and } b = \begin{bmatrix} 6 \\ -1 \end{bmatrix} e^{2t}.$$

5. Solve the following nonhomogeneous system using the method of Laplace transforms.

$$x' + 5x - 2y = 1, y' - 5x + 2y = 3 \text{ given } x(0) = 0 \text{ and } y(0) = 2.$$