3rd Year B.S. (Honors) 2019
Math Lab Assignment 03
Course: AMTH 350 (Math Lab III)
Department of Applied Mathematics
University of Dhaka

Name: Roll No: Write MATLAB program to solve the following problems using Script file.

No:	Problems
1	Consider the following linear system of equations: $10��_1 - ��_2 + 2��_3 = 6$ $-��_1 + 11��_2 - ��_3 + 3��_4 = 25$ $2��_1 - ��_2 + 10��_3 - ��_4 = -11$ $3��_2 - ��_3 + 8��_4 = 15$ Solve the above system, correct up to 5 decimal places, with initial guess $��_{��} = (0,0,0,0)$ using: (i) Jacobi iterative method. (ii) Gauss-Seidel iterative method. (iii) SOR iterative method with $�� = 1.1$.
2	Consider the system of equations given below $2��_1 - 3��_2 + 2��_3 = 5$ $-4��_1 + 2��_2 - 6��_3 = 14$ $2��_1 + 2��_2 + 4��_3 = 8$ (a) Solve the system using Gaussian elimination method. (b) Solve the system using Gaussian-Jordan elimination method.
3	Use the Power method to approximate the dominant eigenvalue of the matrix −4 14 0 �� = ( ) −5 13 0

	−1 0 2 Let ��^{0} = (1,1,1)$^{��}$

4	Solve the following initial value problem over the interval [0,2]. Display all your results graphically. ���� ���� = ����^{3} − 1.5��, ��(0) = 1 (a) ode solver. (b) Using Euler's method with h =0.5 and 0.25. (c) Using the midpoint method with h =0.5. (d) Using Heun's method with h=0.5. (e) Using the fourth-order RK method with h =0.5.
5(a) 5(b)	Solve the following system of ODEs ���� ���� = ���� − ������ ���� ���� = −���� + ������ ��(0) = 2, ��(0) = 1 Taking �� = 1.2, �� = 0.6, �� = 0.8, ������ �� = 0.3. The van der Pol equation is a second order ODE ��^{2}�� ����^{2} − ��(1 − ��^{2})$^{����}$ ����+ �� = 0, ��(0) = 2, ��$'$(0) = 0 where $\mu > 0$ is a scalar parameter. Solve the above equation using shooting method (ode45 solver) and then show the result graphically.

6	Consider the heat conduction equation ����_{��} ���� ���� = ����^{2}�� ����^{2}, ��(��, 0) = 100, ��(0,��) = 0, ��(10,��) = 0, 0 ≤ �� ≤ 10,�� > 0 Solve the above equation using finite difference method and the show the result graphically.(In particular case let �� = 1, ��_{��} = 1 ������ �� = 1)