EME 304– Mechanical Vibrations
Matlab Sheet 1
Solution of the Vibration Equation

1. Plot the time response of each of the following second-order differential equations by using Matlab
   a. $\ddot{x} + 9x = 6e^{t},\ x_o = 1,, v_o = 1.$
   b. $\ddot{x} + 16x = 10 + 3e^{-t},\ x_o = 0,, v_o = 1.$
   c. $3\ddot{x} + 25x = t^2 e^{-t} + t,\ x_o = 1,, v_o = 0.$
   d. $2\ddot{x} + 3\dot{x} + 2x = 10t(1 + sin2t),\ x_o = 1,, v_o = 0.$
   e. $\ddot{x} - 2\dot{x} + 5x = e^{-3t}(1 - tsin3t),\ x_o = 1,, v_o = 2.$
   f. $2\ddot{x} + 15\dot{x} + 6x = 3e^{-2t} + te^{-3t},\ x_o = 1,, v_o = 4.$
2. Discuss the stability of the dynamic systems whose differential equation is given in problems 1.

Hint

1. Use Matlab " Sheet_1_Prob_1_a.m " Program to solve Problem 1.