Use engineering paper. Work only on one side of the paper. Use this sheet as your cover sheet, placed on top of your work and stapled in the top left-hand corner. Number the problems at the top of the page, in the center of the sheet. **Do neat work. Underline your answers. Show how you got your equations. Be sure to show how you got your answers.** Problems 6.57, 6.61 6.64, 6.65, 6.68 count 15 points each. Problem 6.Extra 1 counts 30 points.

6.57  (a) \( s^2 + 2s + 5 = 0 \);  (b) \(-1-j2, -1+j2\);  (c) \( v(t) = k_1 e^{-t}\cos2t + k_2 e^{-t}\sin2t \) \( V \)

6.61  \( v(t) = 10e^{-t} \cos2t - 40e^{-t} \sin2t \) \( V \); \( v(0) = 10, \ v \dot{(0)} = -120 \)

6.Extra 1 The differential equation for 6.61 is given by:

\[
\frac{d^2 v(t)}{dt^2} + \frac{1}{RC} \frac{dv(t)}{dt} + \frac{1}{LC} v(t) = 0 \quad \text{subject to the IC: } v(0) = 10 \ V, \ v'(0) = -120 \ V
\]

(a) Use standard MATLAB to plot the response, \( v(t) \). Label the axes and give a title.

(b) Use Simulink and solve the differential equation. Give the A, B, and C matrices. Include your Simulink diagram. Plot \( v(t) \) with labels and title and compare the answer to that of part (a)

6.64  \( v_0(t) = 16.67[e^{-2x10^5} - e^{-8x10^5}] \) \( V \)

6.65  \( v_c(t) e^{-1.56t}[8 \cos(4.75t) + 2.63 \sin(4.75t)] u(t) \) \( V \); \( v_c(t) = 8 u(-t) \) \( V \)

6.68  \( v(t) = [8 + 2e^{-5t} - 10e^{-t}] u(t) \) \( V \)