

EE 2240  
**Problem #10**

For the system described by  $\ddot{x} + 25x = 0$  :

- a. Determine the characteristic equation.
- b. Determine the natural frequency,  $\omega_n$ .
- c. Determine the damping ratio,  $\zeta$ .
- d. Determine the numerical values of the two roots of the characteristic equation.
- e. Classify the system as *overdamped*, *critically damped*, *underdamped*, or *undamped*.
- f. Assuming  $x(0) = 5$  and  $\dot{x}(0) = 5$ , determine the solution of the given equation.