Problem #11

For the system described by $\ddot{x} + 12\dot{x} + 40x = 0$:

a. Determine the characteristic equation.

b. Determine the natural frequency, ω_n.

c. Determine the damping ratio, ζ .

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 $x(0) = -1$ and $\dot{x}(0) = 8$, determine the solution of the given equation.