Problem #12

For the system described by $\ddot{x} + 12\dot{x} + 36x = 0$:

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 $\dot{x}(0) = -3$, determine the solution of the given equation.