

PROBLEM 1



For $m=1$, $k=1$, and $c=2$, the system is overdamped. The displacement $x(t)$ is given by $x(t) = A e^{-t} + B e^{-3t}$. The initial conditions are $x(0) = 1$ and $\dot{x}(0) = 0$. Solving for A and B gives $A = 1/2$ and $B = 1/2$. Thus, $x(t) = \frac{1}{2}(e^{-t} + e^{-3t})$.

PROBLEM 2

The diagram shows a mechanical system with a mass m , a spring with stiffness k , and a damper with coefficient c . The displacement x is measured from the equilibrium position. The spring force is kx and the damper force is $c\dot{x}$. The equation of motion is $m\ddot{x} + c\dot{x} + kx = 0$.

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