

These are all equations with constant coefficients. For each of them first find the complementary function, then the particular integral, and lastly apply the initial conditions.

1. $\frac{d^2x}{dt^2} - 8\frac{dx}{dt} - 20x = 7e^{5t}$ given that $x = -\frac{1}{5}$ and $\frac{dx}{dt} = 23$ each when $t=0$

2. $\frac{d^2x}{dt^2} - 4x = 25\sin(t)$ given that $x = 1$ and $\frac{dx}{dt} = 5$ each when $t=0$

3. $\frac{d^2x}{dt^2} - 3\frac{dx}{dt} - 2x = e^{\frac{3t}{2}}$ given that $x = 0$ and $\frac{dx}{dt} = 0$ each when $t=0$

4. $\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + 5x = \sin(t)$ given that $x = 0$ and $\frac{dx}{dt} = 1$ each when $t=0$