

Review

1. Solve the differential equations

$$y'' + 11y' + 30y = 0,$$

$$y'' - 12y' + 36y = 0,$$

$$y'' + y' + y = 0.$$

2. Solve the initial value problems

$$y'' - 4y = 0, \quad y(0) = 2, y'(0) = 5,$$

$$y'' - 4y' + 4y = 0, \quad y(0) = 4, y'(0) = -1.$$

3. Solve the differential equations

$$y'' + 2y' + y = e^t,$$

$$y'' - 6y' = \sin 2t,$$

$$y'' + 6y' + 13y = t + 5,$$

$$y'' + y = \sec^2 t,$$

$$y'' - 2y' + y = \frac{e^t}{t^2 + 1}$$

$$y'' + 3y' + 2y = \frac{1}{1 + e^x}.$$

4. What is the period of oscillation of a mass of 30 kg on a spring with constant $k = 5$ N/m and no friction?
5. A 9 kg mass attached to a spring with no friction is observed to oscillate with a period of 4 seconds. What is the period of oscillation if a 6 kg mass is attached to the spring?
6. An object stretches a spring 6 inches in equilibrium. Set up the equation of motion and find its general solution. Find what the equation of motion if the object starts at rest and is acted upon by a force equal to $\sin 8t$?