

$$\frac{dx}{dt} = -3Ae^{-3t} - 2Be^{-2t} + \frac{1}{10}(\cos t - \sin t)$$

$$0 = -3A - 2B + \frac{1}{10}(1)$$

$$-0.1 = -3A - 2B$$

$$3A + 2B = -0.1$$

$$A + B = 0$$

$$A = -B$$

$$3(-B) + 2B = 0.1$$

$$-3B + 2B = 0.1$$

$$-B = 0.1$$

$$B = -0.1$$

$$A = 0.1$$

$$x = 0.1e^{-3t} - 0.1e^{-2t} + \frac{1}{10}(\sin t + \cos t)$$

command window;

close all;

clear all;

clc;

sym x, t

t = [0:0.1:1.5];

x = 0.1 * exp(-3*t) - 0.1 * exp(-2*t) + 0.1 * (sin(t) + cos(t))

plot(t, x)

$$\frac{d^2x}{dt^2} + 5 \frac{dx}{dt} + 6x = \cos t$$

$$m^2 + 5m + 6 = 0$$

$$m^2 + 5m + \left(-\frac{5}{2}\right)^2 = -6 + \frac{25}{4}$$

$$\left(m + \frac{5}{2}\right)^2 = \frac{1}{4}$$

$$m + \frac{5}{2} = \pm \frac{1}{2}$$

$$m = -3 \text{ or } -2$$

$$CF = Ae^{-3t} + Be^{-2t}$$

$$x = C \cos t + D \sin t$$

$$\frac{dy}{dx} = -C \sin t + D \cos t$$

$$\frac{d^2y}{dx^2} = -C \cos t - D \sin t$$

$$(-C \cos t - D \sin t) + 5(-C \sin t + D \cos t) +$$

$$6(C \cos t + D \sin t) = \cos t$$

$$(-C \cos t + 5D \cos t + 6C \cos t) + (-D \sin t - 5C \sin t + 6D \sin t) = \cos t$$

$$5C \cos t + 5D \cos t = \cos t \quad \text{--- eq (1)}$$

$$-5C \sin t + 5D \sin t = 0 \quad \text{--- eq (2)}$$

$$5C + 5D = 1$$

$$-5C + 5D = 0$$

$$10D = 1$$

$$D = \frac{1}{10}$$

$$5C + 5\left(\frac{1}{10}\right) = 1$$

$$C = \frac{1}{2} - \frac{1}{10}$$

$$C = \frac{2}{5}$$

$$P.I = x = \frac{1}{10} \cos t + \frac{1}{10} \sin t$$

$$Ae^{-3t} + Be^{-2t} + \frac{1}{10} (\sin t + \cos t)$$

when $t = 0$

$$m = -3 \text{ or } -2$$

$$CF = Ae^{-3t} + Be^{-2t}$$

$$z = (C \cos t + D \sin t)$$

$$\frac{dy}{dx} = -C \sin t + D \cos t$$

$$\frac{d^2y}{dx^2} = -C \cos t - D \sin t$$

$$(-C \cos t - D \sin t) + 5(-C \sin t + D \cos t) +$$

$$6(C \cos t + D \sin t) = \cos t$$

$$(-C \cos t + 5D \cos t + 6C \cos t) + (-D \sin t - 5C \sin t + 6D \sin t) = \cos t$$

$$5C \cos t + 5D \cos t = \cos t \quad \text{--- eq (1)}$$

$$-5C \sin t + 5D \sin t = 0 \quad \text{--- eq (2)}$$

$$5C + 5D = 1$$

$$-5C + 5D = 0$$

$$10D = 1$$

$$D = \frac{1}{10}$$

$$5C + 5\left(\frac{1}{10}\right) = 1$$

$$C = \frac{1}{2} - \frac{1}{10}$$

$$C = \frac{1}{10}$$

$$P.I = z = \frac{1}{10} \cos t + \frac{1}{10} \sin t$$

$$Ae^{-3t} + Be^{-2t} + \frac{1}{10} (\sin t + \cos t)$$

$$\text{when } t = 0, \quad z = 0.1 \quad \text{and} \quad \frac{dy}{dx} = 0$$

$$0.1 = A(1) + B(1) + \frac{1}{10} (+1)$$

$$0.1 = A + B + 0.1$$

$$A + B = 0.1 - 0.1$$

$$A + B = 0$$