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16/Eng06/007
ENG 381

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

C.F = $m^2 + 5m + 6 = 0$

$m^2 + 3m + 2m + 6 = 0$

$m(m+3) + 2(m+3)$

$(m+3)(m+2)$

$m = -3$ or $m = -2$

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

~~P.I: f(x) cost~~ P.I: $f(x) = \cos t$

$x = A\cos t + B\sin t$

$\frac{dx}{dt} = -A\sin t + B\cos t$

$\frac{d^2x}{dt^2} = -A\cos t - B\sin t$

$(-A\cos t - B\sin t) + 5(-A\sin t + B\cos t) + 6(A\cos t + B\sin t) = \cos t$

$(-A\cos t - B\sin t) + (-5A\sin t - 5B\cos t) + (6A\cos t + 6B\sin t) = \cos t$

$5A\cos t + 5B\sin t - 5A\sin t + 5B\cos t = \cos t$

Collecting the coefficient of like terms

$5A + 5B = 1$

$-5A + 5B = 0$

$10B = 1$

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

$5A + 5B = 1$

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

$5A = 1 - \frac{1}{2}$

$5A = \frac{1}{2}$

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

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

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

$x = C.F + P.F$

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

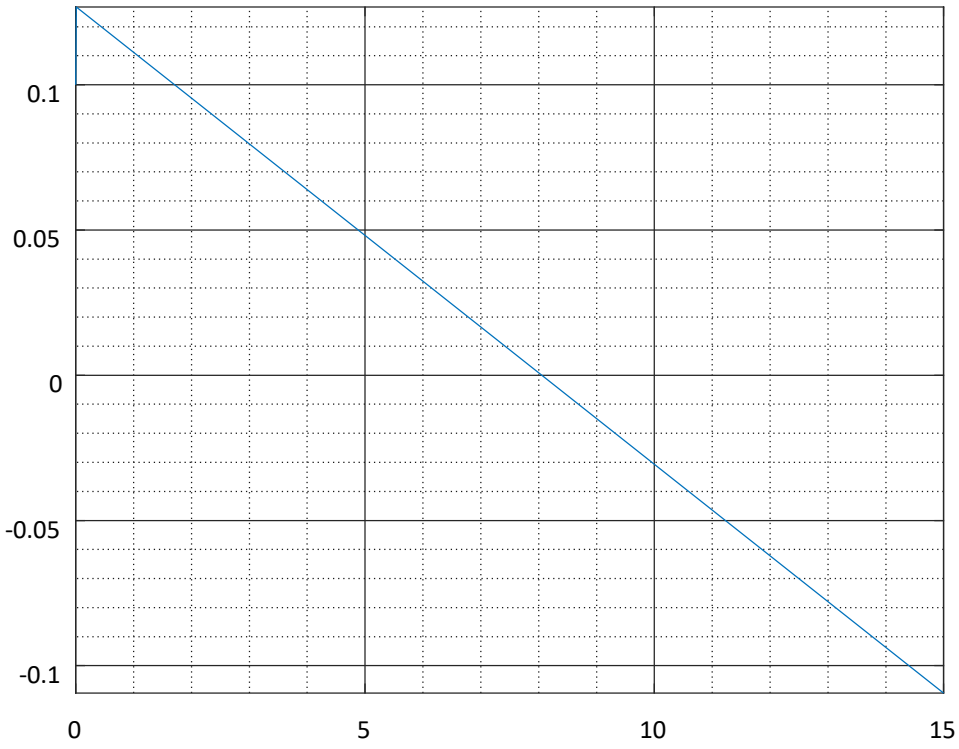
~~$x = \frac{1}{10}(0)^{-3t}$~~

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

```
x =

exp(-3*t)/10 - exp(-2*t) + cos(t) + sin(t)


tn =

         0
    0.0100
   15.0000


xn =

                                                      1/10
 cos(1/100) - exp(-1/50) + exp(-3/100)/10 + sin(1/100)
            cos(15) - exp(-30) + exp(-45)/10 + sin(15)

>>
```

COPMMANDS

```
commandwindow
clear
clc
close all
syms t
x = 0.1*(exp(-3*t))-exp(-2*t)+cos(t)+sin(t)
tn = [0;0.01;15]
xn = subs(x,tn)
figure (1)
plot(tn,xn)
grid on
grid minor
axis tight
xlabel ('t')
ylabel ('x')
```


0.1
0.05
0
-0.05
-0.1
0
5
10
15