Abdullah Kökcü 182 530 23

1) $(D^2+4D+3)\ y(t) = (D+5)\ f(t)$

$(\lambda^2+4\lambda+3) = (\lambda+3)(\lambda+1)$ $\quad \lambda_1 = -1 \quad \lambda_2 = -3$

$y_n(t) = C_1 e^{-t} + C_2 e^{-3t}$

$y_n'(t) = -C_1 e^{-t} - 3C_2 e^{-3t}$

$N=2 \Longrightarrow N-1=1 \Rightarrow y_n'(0)=1 \quad y_n(0)=0$

$C_1 + C_2 = 0$

$-C_1 - 3C_2 = 1$ (leksi)

$\Big\} \quad C_2 = -\frac{1}{2} \quad C_1 = \frac{1}{2}$

$h(t) = [D^* y_n(t)]\, u(t) = -\frac{1}{2}e^{-t} + \frac{3}{2}e^{-3t}$

2) $y_{soc} = x(t) * h(t)$

$= \frac{1}{2} e^{-2t} (-e^{t} + 3e^{-3t})$

$= \frac{1}{2}\left[-e^{-2t}\cdot e^{t} + e^{-2t}\cdot 3e^{-3t}\right] = \frac{1}{2}\left(+\frac{e^{-2t}-e^{-t}}{+3} + \frac{e^{-2t}\cdot 3e^{-3t}}{1}\right)$

$= \left(-\frac{e^{-t}}{6} + \frac{2e^{-2t}}{3} + \frac{3e^{-3t}}{2}\right) u(t)$

3)

$y(t) = x(t) * h(t)$

$= u(t) * 8e^{5t}\, u(t)$

$= 8\left(\frac{1-e^{5t}}{-5}\right) u(t)$

$= -\frac{8}{5}\left(1-e^{5t}\right) u(t)$