

# İŞARET İŞLEME BÜTÜNLEME SINAVI

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1)  $\lambda^2 + 4\lambda + 4 = 0$   $\lambda_1 = -2$   $\lambda_2 = -2$  çift köklü kök

$y(t) = c_1 e^{\lambda_1 t} + c_2 e^{\lambda_2 t}$  denkleminde

$y(t) = c_1 e^{-2t} + c_2 t e^{-2t} \Rightarrow y(t) = (c_1 + c_2 t) e^{-2t}$

$y(0) = 3$

$y(0) = 3 \Rightarrow (c_1 + c_2 \cdot 0) e^{-2 \cdot 0} = \boxed{c_1 = 3}$

$\dot{y}(t) = (-2e^{-2t} - 2e^{-2t} \cdot (c_1 + c_2 t))$  olur

$\dot{y}(0) = -4 \Rightarrow c_2 - 2c_1 = -4 \quad -4 = c_2 - 6 \Rightarrow \boxed{c_2 = 2}$

$\boxed{y(t) = (3 + 2t) e^{-2t}}$

2)

a)  $\left( \delta\left[\frac{0}{1}\right] - \delta\left[\frac{-1}{0}\right] \right) \cdot 5 \cdot 10^3 = y[0]$

$y[0] = 5 \cdot 10^{-3}$

$\left( \delta\left[\frac{1}{0}\right] - \delta\left[\frac{0}{1}\right] \right) \cdot 5 \cdot 10^3 = y[1]$

$y[1] = -5 \cdot 10^{-3}$

$\left( \delta\left[\frac{2}{0}\right] - \delta\left[\frac{1}{0}\right] \right) \cdot 5 \cdot 10^3 = y[2]$

$y[2] = 0$

b)  $\left( u\left[\frac{0}{1}\right] - u\left[\frac{-1}{1}\right] \right) \cdot 5 \cdot 10^3 = y[0]$

$y[0] = 0$

$\left( u\left[\frac{1}{1}\right] - u\left[\frac{0}{1}\right] \right) \cdot 5 \cdot 10^3 = y[1]$

$y[1] = 0$

$\left( u\left[\frac{2}{1}\right] - u\left[\frac{1}{1}\right] \right) \cdot 5 \cdot 10^3 = y[2]$

$y[2] = 0$

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3)  $y[-1]=1 \quad y[-2]=33$

$$y[k] + 0.3y[k-1] - 0.1y[k-2] = x[k] + 2x[k-1]$$

$$(E^2 + 0.3E - 0.1)y[k] = E(E+2)x[k]$$

$$(y^2 + 0.3y - 0.1) = (y+0.5)(y-0.2)$$

$$y_0[k] = c_1 \underbrace{(-0.5)^k}_{y=-0.5} + c_2 \underbrace{(0.2)^k}_{y=0.2} \quad k=-1 \quad k=-2$$

$$k=-1 \rightarrow y_0[-1] = c_1(-0.5)^{-1} + c_2(0.2)^{-1}$$

$$1 = -2c_1 + 5c_2$$

$$k=-2 \rightarrow y_0[-2] = c_1(-0.5)^{-2} + c_2(0.2)^{-2}$$

$$33 = c_1(0.25)^{-1} + c_2(0.04)^{-1}$$

$$4c_1 + 25c_2 = 33$$

$$-4c_1 + 10c_2 = 2$$

$$4c_1 + 25c_2 = 33$$

$$35c_2 = 35$$

$$c_2 = 1$$

$$c_1 = 2$$

$$y_0[k] = 2(-0.5)^k + (0.2)^k$$

4) a)  $e^{st}u(t) \cdot u(t) = \frac{1-e^{-st}}{-s} u(t) \Rightarrow \boxed{\frac{8-8e^{-st}}{-s}}$

b)  $F(t) = [-2e^{15}, e^{-3t} + 3e^3 \cdot e^{-t}]u(t-3)$

$$F(s) = \frac{-2e^{15}}{s+5} + \frac{3e^{-3}}{s+1} \text{ oder}$$

c) 1. Laplace  $\rightarrow 3e^{-4t}e^{-3t} = 3 \left[ \frac{e^{-4t}-e^{-3t}}{-4-(-3)} \right] = \frac{3e^{-4t}-3e^{-3t}}{-1}$

2. Laplace  $\rightarrow -1 \cdot 3[e^{-4t} \cdot e^{-4t}] = -3te^{-4t}u(t)$

$$y(t) = 3 \left( \frac{e^{-4t}-e^{-3t}-te^{-4t}}{-1} \right) u(t) \text{ oder}$$

d)  $\frac{s+17}{s^2+5s-5} = \frac{A}{s+5} + \frac{B}{s-1}$

$$5(A+B) = 5$$

$$-A+5B = 17$$

$$A+B=1$$

$$-A+5B=17$$

$$6B=18$$

$$B=3$$

$$A=-2$$

$$\frac{-2}{s+5} + \frac{3}{s-1}$$

Ters Laplace

$$[-2e^{-5t} + 3e^t]u(t)$$