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1) $x(t) = u(t) \Leftrightarrow X(s) = \frac{1}{s}$

$s^2 + 4s + 3$
$+3$
$+1$

$$\frac{d^2y}{dt} + \frac{dy}{dt} + 3y(t) = 2\frac{dx}{dt} + x(t)$$

$$(s^2 + 4s + 3)\, y(s) = 2 + \frac{1}{s}$$

$$y(s) = \frac{s+2}{1.(s+1)(s+3)} = \frac{C_1}{s} + \frac{C_2}{s+1} + \frac{C_3}{s+3}$$

$$C_1(s^2 + 4s + 3) + C_2(s^2 + 3s) + C_3(s^2 + s)$$

$$s^2(C_1 + C_2 + C_3) + s(4C_1 + 3C_2 + C_3) + 3C_1$$

$$H(s) = \frac{\frac{s+2}{s(s+1)(s+3)}}{\frac{1}{s}}$$

$C_1 = \frac{2}{3}$ $\quad C_2 + C_3 = -\frac{2}{3}$

$3C_2 + C_3 = 1 - \frac{8}{3} = \frac{-7}{3}$

$2C_2 = -\frac{5}{3} \Rightarrow C_2 = -\frac{5}{6}$

$C_3 = +\frac{1}{6}$

$$\left(H(s) = \frac{s+2}{(s+1)(s+3)}\right) \text{(A)} \qquad \text{(kararsız) (B)}$$

$$\left(y(s) = \frac{2/3}{s} + \frac{\frac{-5}{6}}{s+1} + \frac{\frac{1}{6}}{s+3}\right) \text{(C)}$$

$$\left(y(t) = \frac{2}{3}u(t) - \frac{5}{6}e^{-t}u(t) + \frac{1}{6}e^{-3t}u(t)\right) \text{(d)}$$

2) $x(t - t_0)$ ötteleme $e^{-st_0} X_s$

$$\left(F(s) = \frac{-2e^{-3s}}{s+5} + \frac{3e^{-3s}}{s+1}\right)$$

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

$$= \left(\frac{15}{4}\left[\left(\frac{1}{5}\right)^k - \left(\frac{1}{3}\right)^k + \frac{2k}{3}\left(\frac{1}{3}\right)^k\right]u[k]\right)$$

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(4) $\frac{F(z)}{z} = \frac{9}{z(z+2)(z-\frac{1}{2})^2} = \frac{c_1}{z} + \frac{c_2}{z+2} + \frac{d_1}{(z-\frac{1}{2})} + \frac{d_2}{(z-\frac{1}{2})^2}$

$c_1 = \left.\frac{9}{(z+2)(z-\frac{1}{2})^2}\right|_0 = 18$

$c_2 = \left.\frac{9}{z\cdot(z-\frac{1}{2})^2}\right|_{-2} = \frac{18}{25} = -0,72$

$c_1 + c_2 + d_1 = 0$ z^3 değer

$18 - 0,72 + d_1 = 0$

$d_1 = -17,28$

$18\,\delta[n] - 0,72(-2)^n u[n] - 17,28\left(\frac{1}{2}\right)^n U[n] + d_2 n\left(\frac{1}{2}\right)^n U[n]$

(5) $z^2 y[z] - z^2 y[0] - z y[1] + 3z y[z] - 3z y[0] + 2y[z]$

$y(z)(z^2+3z+2) = z^2 + 5z - 2 \cdot \frac{z}{z-1}$

$y(z) = \frac{z^2+5z-2}{z^2+3z+2} \cdot \frac{z}{z-1}$

$\frac{y(z)}{z} = \frac{z^2+5z-2}{(z-1)(z+1)(z+2)} = \frac{c_1}{z-1} + \frac{c_2}{z+1} + \frac{c_3}{z+2}$

$= \frac{2/3}{z-1} + \frac{-3}{z+1} + \frac{-8/3}{z+2}$

$y(z) = \frac{2z/3}{z-1} - \frac{3z}{z+1} - \frac{8}{3}\frac{z}{z+2}$

$y[k] = \frac{2U[k]}{3} - 3(-1)^n u[k] - \frac{8}{3}(-2)^n U[k]$