**21)** $L^{-1}\{Y(s)\} = y(t)$ olmak üzere $t = 0$ ~~anında sabit katsayılı lineer bir diferansiyel denkleme~~ ~~Laplace dönüşümü uygulanmış ve~~ $Y(s) = \dfrac{2s+1}{(s^2+2s+1)(s-2)}$ ~~olarak bulunmuştur. Buna göre,~~ $y(t)$ çözüm fonksiyonu aşağıdakilerden hangisidir?

$L^{-1}(Y(s))$

A) $y(t) = \frac{5}{7}\sin 2t - \frac{5}{7}e^{-t} + \frac{3}{7}te^{-t}$

B) $y(t) = \frac{5}{9}e^{2t} - \frac{5}{9}e^{-t} + \frac{1}{3}te^{-t}$

C) $y(t) = \frac{5}{9}e^{t} - \frac{5}{9}e^{-2t} + \frac{1}{3}te^{-2t}$

D) $y(t) = \frac{5}{3}e^{3t} - \frac{5}{9}e^{-t} + \frac{1}{3}te^{-t}$

E) $y(t) = \frac{5}{9}te^{2t} - \frac{5}{9}e^{-t} + \frac{1}{3}te^{-t}$

$$\frac{As+B}{s^2+2s+1} + \frac{C}{s-2} = \frac{2s+1}{(\,)(\,)}$$

$$As^2 + Bs - 2As - 2B + Cs^2 + 2Cs + C = 2s+1$$

$$\begin{cases} A + C = 0 \\ B - 2A + 2C = 2 \\ -2B + C = 1 \end{cases}$$

$$\begin{aligned} 2/\ B - 4A &= 2 \\ -2B - A &= 1 \\ + \quad & \\ \hline -9A &= 5 \end{aligned}$$

$A = -\frac{5}{9}$ $\quad C = \frac{5}{9}$

$B = \frac{C-1}{2} = -\frac{2}{9}$

$$y(t) = L^{-1}\left\{\frac{-\frac{5}{9}s - \frac{2}{9}}{s^2+2s+1} + \frac{5}{9}\frac{1}{s-2}\right\}$$

$$y(t) = -\frac{5}{9}L^{-1}\left\{\frac{s+\frac{2}{5}}{(s+1)^2}\right\} + \frac{5}{9}e^{2t}$$

$$\Downarrow$$

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

$$y(t) = -\frac{5}{9}e^{-t} + \frac{\cancel{5}}{\cancel{9}_{3}}\left(\frac{\cancel{3}}{\cancel{5}}\right)te^{-t} + \frac{5}{9}e^{2t}$$

$$= -\frac{5}{9}e^{-t} + \frac{1}{3}te^{-t} + \frac{5}{9}e^{2t}$$

$x, y', y''$ $y$ missing

**1)** $xy'' = x(y')^2 + 4y''$ ~~dif. denkleminde~~ $\frac{dy}{dx} = y'$ aşağıdakilerden hangisidir?

a) $y' = -\dfrac{1}{x - 4\ln|x-4| + C}$ b) $y' = -\dfrac{1}{x + 4\ln|x-4| + C}$

c) $y' = \dfrac{1}{x + \ln|4-x| + C}$ d) $y' = \dfrac{1}{x - 4\ln|x-4| + C}$ e) $y' = \dfrac{1}{-x + \ln|x-4| + C}$

$y' = p, \quad y'' = \frac{dp}{dx}$

$x\frac{dp}{dx} = xp^2 + 4\frac{dp}{dx} \Rightarrow (x-4)\frac{dp}{dx} = xp^2$

$\frac{dp}{p^2} = \frac{x\,dx}{x-4}$ $\int \frac{x\,dx}{x-4} = \int \left(1 + \frac{4}{x-4}\right)dx$

$-\frac{1}{p} = x + 4\ln|x-4| + C$

$p = -\dfrac{1}{x + 4\ln|x-4| + c}$