quiz 6 − 5:00 PM

① $y''' - 7y' + 6y = 0$

characteristic eqn: $r^3 - 7r + 6 = 0$ (*)

one root of (*) $r = -3$ :

$$(r^3 - 7r + 6) : (r+3) = r^2 - 3r + 2$$
$$\underline{-r^3 \pm 3r^2}$$
$$0 \quad -3r^2 - 7r$$
$$\underline{\mp 3r^2 \mp 9r}$$
$$0 \quad 2r + 6$$
$$\underline{-2r \pm 6}$$
$$0$$

$\Rightarrow r^3 - 7r + 6 = (r+3)(r^2 - 3r + 2)$

roots of $r^2 - 3r + 2 = 0$:

$$r = +\frac{3}{2} \pm \sqrt{\frac{9}{4} - 2} = \frac{3}{2} \pm \frac{1}{2} = 2; 1$$

$\Rightarrow r^3 - 7r + 6 = (r+3)(r-2)(r-1)$

$\Rightarrow$ general sln. of given deq (1):

$$\underline{y(t) = c_1 e^{-3t} + c_2 e^{2t} + c_3 e^{t}}, \quad c_1, c_2, c_3 \in \mathbb{R}.$$

2.

$$e^{-2s}\frac{2}{s} + \frac{s-1}{s^2-2s+2} = \mathcal{L}(?)$$

•) $e^{-2s}\dfrac{2}{s} = \mathcal{L}\left(2H_2(t)\right)$

•) $\dfrac{s-1}{s^2-2s+2} = \dfrac{(s-1)}{(s-1)^2+1} = \mathcal{L}\left(e^t \cos t\right)$

$$\Rightarrow e^{-2s}\frac{2}{s} + \frac{s-1}{s^2-2s+2} = \underline{\underline{\mathcal{L}\left(2H_2(t) + e^t \cos t\right)}}.$$