CPE381 #11

HW3 2/25
MT 3/4-9
PE1 3/16

(*) $H(s) = \frac{1}{s^2-4s+3} = \frac{1}{(s-1)(s-3)}$

$h(t) = \mathcal{L}^{-1}\left[\frac{1}{(s-1)(s-3)}\right]$ $\frac{A}{s-1} + \frac{B}{s-3}$

$p_1 = 1$
$p_2 = 3$

$A = H(s)\cdot(s-1)\Big|_{s=p_1=1} = \frac{1}{(s-1)(s-3)}\cdot(s-1)\Big|_{s=1} = \frac{1}{2}$

$B = \frac{1}{s-1}\Big|_{s=3} = \frac{1}{2}$

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

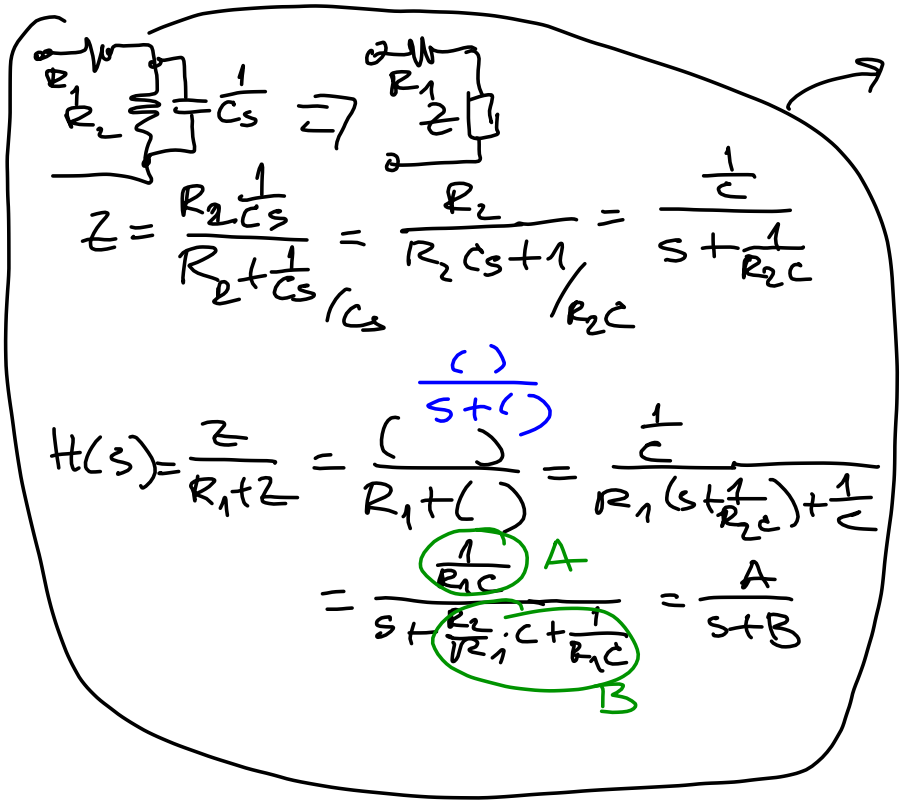
$\mathcal{L}[e^{-at}] = \frac{1}{s+a}$

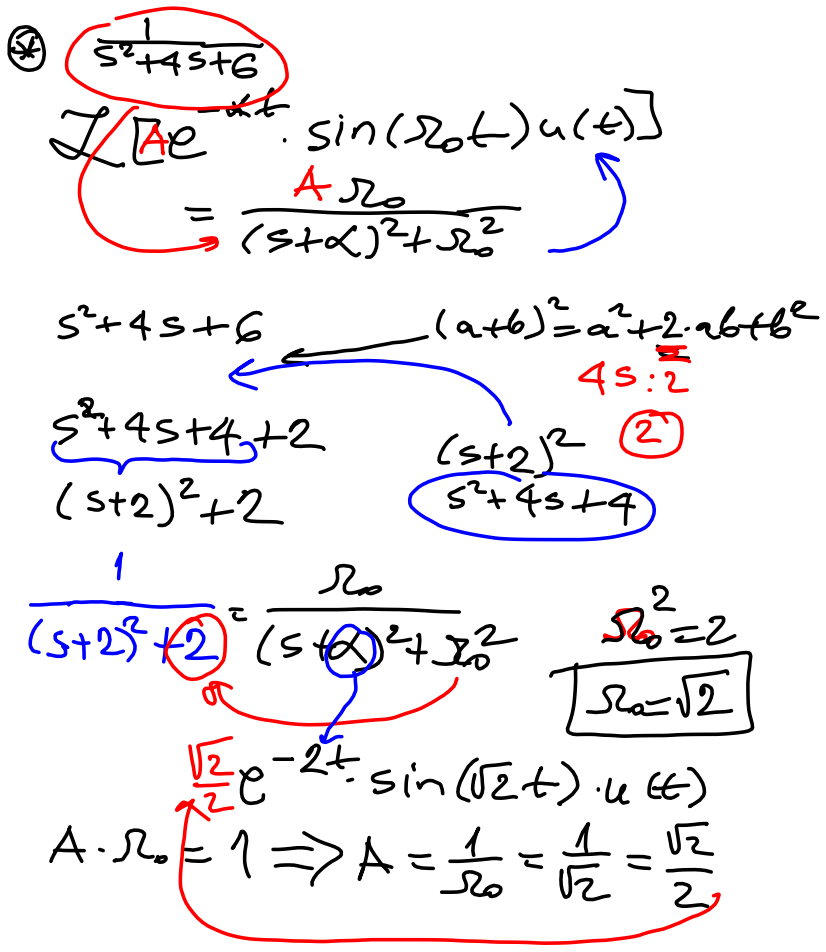
$s(t)$

$\frac{1}{s}\cdot\frac{1}{s-1}\cdot\frac{1}{s-3} \Rightarrow \frac{A}{s} + \frac{B}{s-1} + \frac{C}{s-3}$

$s(t) = \mathcal{L}^{-1}[\ ] = \downarrow$

$A\cdot u(t) + \dots$


R1
R2
1/Cs
Z
R1
Z
Z = R2 1/Cs / (R2 + 1/Cs) = R2 / (R2Cs + 1) = 1/C / (s + 1/R2C)
H(s) = Z/(R1+Z) = ( ) / (s+( )) / (R1 + ( )) = 1/C / (R1(s + 1/R2C) + 1/C)
= 1/R1C / (s + R2/R1 · C + 1/R2C) = A/(s+B)
A
B


1/(s²+4s+6)
L⁻¹[Ae^(-αt) · sin(Ω0t)u(t)]
= AΩ0 / ((s+α)² + Ω0²)
s²+4s+6
(a+b)² = a² + 2ab + b²
4s : 2
s²+4s+4+2
(s+2)²+2
(s+2)²
s²+4s+4
2
1/((s+2)²+2) = Ω0/((s+α)²+Ω0²)
Ω0² = 2
Ω0 = √2
√2/2 e^(-2t) · sin(√2 t) · u(t)
A · Ω0 = 1 ⇒ A = 1/Ω0 = 1/√2 = √2/2

$$S(s) = U(s) \cdot H(s) = \frac{1}{s} \cdot \frac{A}{s+B}$$

$$= \frac{C}{s} + \frac{D}{s+B}$$ → const.

$$s(t) = \mathcal{L}^{-1}[S(s)]$$

$$C = \frac{A}{B} \qquad C = H(s) \cdot s \Big|_{s=0}$$

$$D = -\frac{A}{B}$$

$$s(t) = C \cdot u(t) + D e^{-Bt} \cdot u(t)$$

$R_1 = R_2 = 1\,M\Omega$

$C = 1\,\mu F$

$$A = \frac{1}{R_1 C} = 1$$

$$B = 2 \qquad C = \frac{A}{B} = \frac{1}{2} \qquad D = -\frac{1}{2}$$