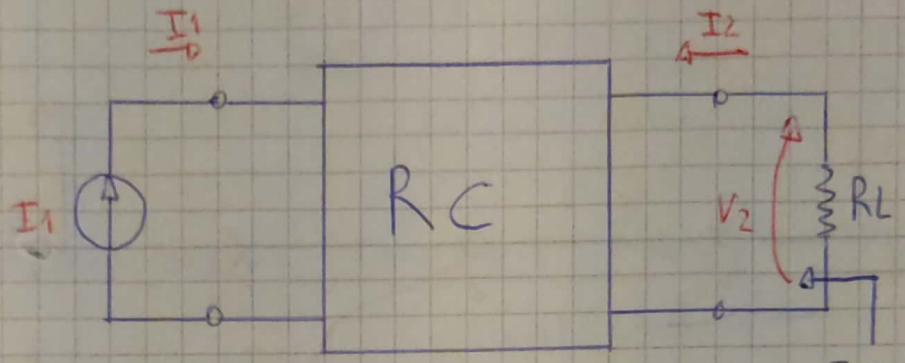
TAREA SEMANAL 12

1)



$$-\frac{I_2}{I_1} = H\,\frac{s^2+5s+4}{s^2+8s+12}$$

$$z_{22} = \left.\frac{V_2}{I_2}\right|_{I_1=0}$$

$$z_{21} = 6H$$

a)

$$\left.-\frac{I_2}{I_1}\right|_{V_2=(-I_2)R_L} = H\,\frac{s^2+5s+4}{s^2+8s+12} \quad ; \quad z_{21} = 6H = \left.\frac{V_2}{I_1}\right|_{I_2=0}$$

PARTIMOS DE:

$$V_2 = z_{21}\cdot I_1 + z_{22}\cdot I_2 = (-I_2)R_L \rightarrow (-I_2)(R_L + z_{22}) = z_{21} = I_1$$

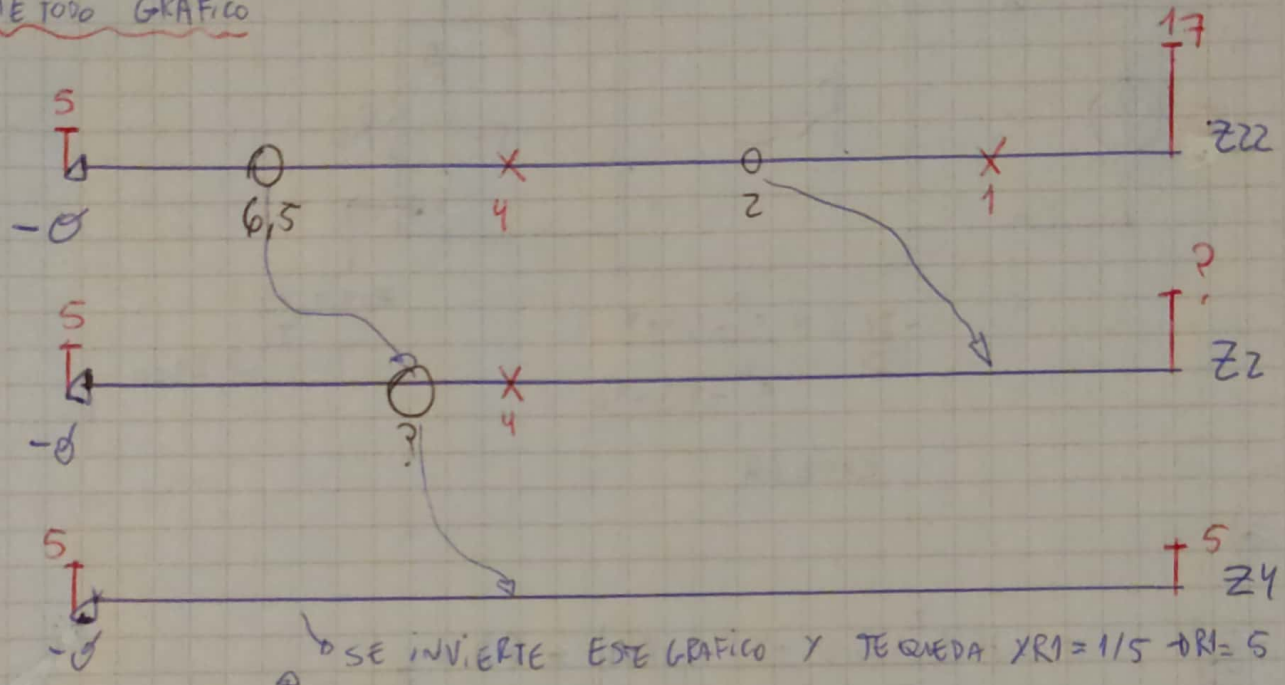
$$\frac{(-I_2)}{I_1} = \frac{z_{21}}{R_L + z_{22}} = \frac{\overbrace{6H}^{z_{21}}}{1 + z_{22}} = \frac{H(s^2+5s+4)}{s^2+8s+12}$$

($R_L = 1$)

$$z_{22} = \frac{6(s^2+8s+12)}{s^2+5s+4} - 1$$

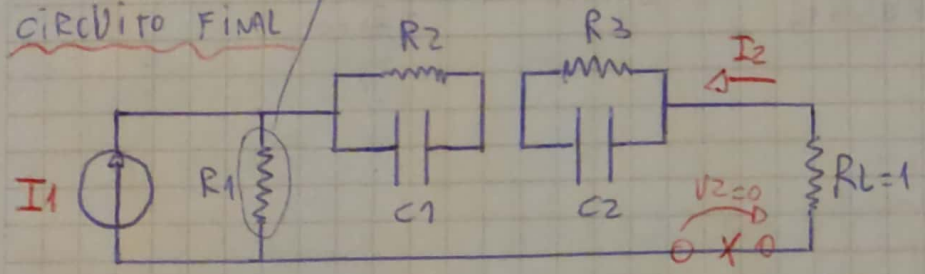
$$z_{22} = \frac{5s^2 + 43s + 68}{s^2 + 5s + 4} \rightarrow z_{22} = \frac{5(s+\tilde{z})(s+\tilde{6,5})}{(s+1)(s+4)}$$

METODO GRAFICO



SE INVIERTE ESTE GRAFICO Y TE QUEDA $XR1 = 1/5 \rightarrow R1 = 5$

CIRCUITO FINAL



$$z_{C1R2} = \frac{1}{\frac{sC_1R_2+1}{R_2}}$$

$$z_{C2R3} = \frac{1}{\frac{sC_2R_3+1}{R_3}}$$

$$T1 = \begin{pmatrix} 1 & 0 \\ 1/R1 & 1 \end{pmatrix} ; \quad T2 = \begin{pmatrix} 1 & R_L + \frac{R_2}{sC_1R_2+1} + \frac{R_3}{sC_2R_3+1} \\ 0 & 1 \end{pmatrix}$$

$$T = T1 \cdot T2 = \begin{pmatrix} 1 & \cdots \\ \cdots & \frac{1}{R1}\left(\frac{R_L(sC_1R_2+1)(sC_2R_3+1) + R_2(sC_2R_3+1) + R_3(sC_1R_2+1)}{(sC_1R_2+1)(sC_2R_3+1)}\right) + 1 \end{pmatrix}$$

$$T = \begin{pmatrix} 1 & \\ \cdots & \frac{s^2C_1C_2R_LR_2R_3 + s(R_LC_1R_2 + C_2R_3) + R_2C_2R_3 + R_3C_1R_2 + R_2 + R_3 + R_L}{s^2C_1C_2R_1R_2R_3 + s(R_1(C_1R_2 + C_2R_3)) + R_1} + 1 \end{pmatrix}$$

SIGUE

b)

$K_1 = \lim_{s \to -1} \cancel{s+1} \; \frac{5(s+2)(s+6/5)}{\cancel{(s+1)}(s+4)} \rightarrow K_1 = 55/6 \rightarrow Z_{R_3 C_2} = \frac{55/6}{s+1}$

Z_{22}

$C_2 = 6/55$

$R_3 = \frac{55}{6}$

$Z_2 = Z_{22} - Z_{R_3 C_2} = \frac{5s^2 + 8{,}5 \cdot 5s + 13 - \frac{55}{6}s - 55 \cdot \frac{4}{6}}{(s+1)(s+4)}$

$Z_2 = \frac{5s^2 + 100/3 s + 85/3}{(s+1)(s+4)} = \frac{5\cancel{(s+1)}(s+17/3)}{\cancel{(s+1)}(s+4)}$

$Z_2 = \frac{5(s+17/3)}{s+4}$, $K_2 = \lim_{s \to -4} \cancel{s+4} \; \frac{5(s+17/3)}{\cancel{s+4}} \rightarrow K_2 = 25/3$

$Z_{R_2 C_1} = \frac{K_2}{s+4} \Rightarrow Z_{R_2 C_1} = \frac{25/3}{s+4} \rightarrow Z_{R_2 C_1} = \frac{1}{\frac{3}{25}s + \frac{4}{25/3}}$

$R_2 = 25/12$

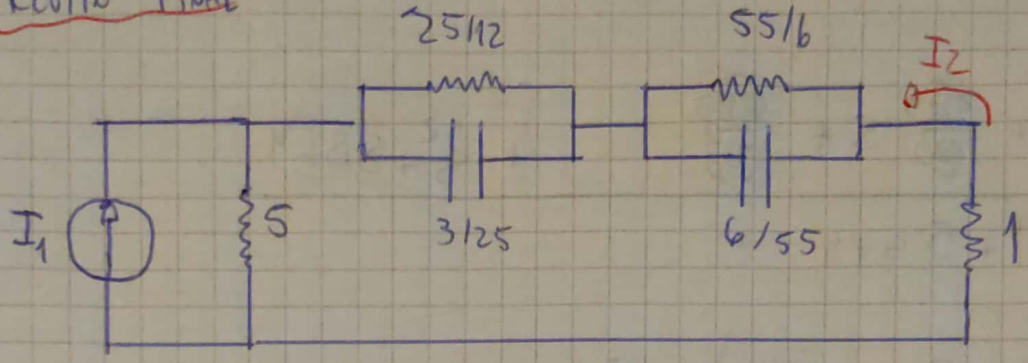
$C_1 = 3/25$

$Z_4 = Z_2 - Z_{R_2 C_1} = \frac{5(s+17/3)}{s+4} - \frac{25/3}{s+4} = \frac{5s + 20}{s+4} = 5$

$Y_4 = 1/5 = G_1$; $R_1 = 5$

↳ DEBE EMPEZAR EN DERIVADA

CIRCUITO FINAL



VERIFICACIÓN

$$T1 = \begin{pmatrix} 1 & 0 \\ \underbrace{\frac{1}{R1}}_{G1} & 1 \end{pmatrix} \quad ; \quad T2 = \begin{pmatrix} 1 & Z_{R2C1} + Z_{R3C2} + 1 \\ 0 & 1 \end{pmatrix} \leftarrow R_L$$

$$T = T1 \cdot T2 = \begin{pmatrix} \cdots & \cdots \\ \cdots & D \end{pmatrix}$$

$$D = G1\left(Z_{R2C1} + Z_{R3C2} + 1\right) + 1 \quad ;$$

$$D = \underbrace{\frac{1}{5}}_{G1}\left(\frac{25/3}{(S+4)} + \frac{55}{6}\frac{1}{S+1} + 1\right) + 1$$

$$D = \frac{1}{5}\left(\frac{5/3}{S+4} + \frac{11/6}{S+1} + \frac{6}{5}\right) = \frac{\frac{5}{3}S + \frac{5}{3} + \frac{11}{6}S + \frac{11}{6} + \frac{6}{5}S^2 + \frac{6}{5}S + \frac{24}{5}}{(S+1)(S+4)} \quad (44)$$

$$D = \frac{\frac{6}{5}s^2 + \frac{19}{2}s + \frac{69}{5}}{s^2+5s+4}$$

$$D = \frac{\frac{6}{5}s^2 + \frac{19}{2}s + \frac{69}{5}}{s^2+5s+4}$$

$$D = \frac{\frac{6}{5}\left(s^2 + \frac{95}{12}s + \frac{23}{2}\right)}{s^2+5s+4}$$

$$D = \frac{6}{5}\,\frac{(s+1{,}92)(s+6)}{(s+4)(s+1)}$$

$$T(s) = \frac{s}{6}\,\frac{s^2+5s+4}{s^2+\frac{95}{12}s+\frac{23}{2}}$$

$\frac{95}{12} \approx 7{,}92 \approx 8$

$\frac{23}{2} = 11{,}5 \approx 12$

✓ $H = 5/6$

CUANDO SACO RAÍCES DE 2ºº (NUM) QUEDAN REDONDEADAS.