Giuliana Ruffa

TS 1

HOJA Nº 1

FECHA

1) Desarrollo algebraico:

$$\frac{V_1 - V_2}{R_1 + R_2} = \frac{V_1 - \dfrac{V_1 \cdot R_3}{R_3 + 1/Cs}}{R_1} = \frac{1}{R_1}\left(V_1 - \frac{V_1 \cdot sCR_3}{sCR_3 + 1}\right) = \frac{V_1}{R_1}\left(1 - \frac{sCR_3}{sCR_3 + 1}\right)$$

$$\frac{V_1 - V_2}{R_1 + R_2} = \frac{V_1}{R_1}\left(1 - \frac{sCR_3}{CR_3\left(s + \frac{1}{CR_3}\right)}\right) = \frac{V_1}{R_1}\left(1 - \frac{s}{s + \frac{1}{CR_3}}\right) = \frac{V_1}{R_1}\left(\frac{1/CR_3}{s + \frac{1}{CR_3}}\right)$$

$$\frac{V_1 - V_2}{R_1 + R_2} = V_1 \cdot \frac{1}{CR_1 . R_3} \cdot \frac{1}{s + \frac{1}{CR_3}}$$

Despejamos V_2.

$$-V_2 = \left(V_1 \cdot \frac{1}{CR_1R_3} \cdot \frac{1}{s + \frac{1}{CR_3}}\right)(R_1 + R_2) - V_1$$

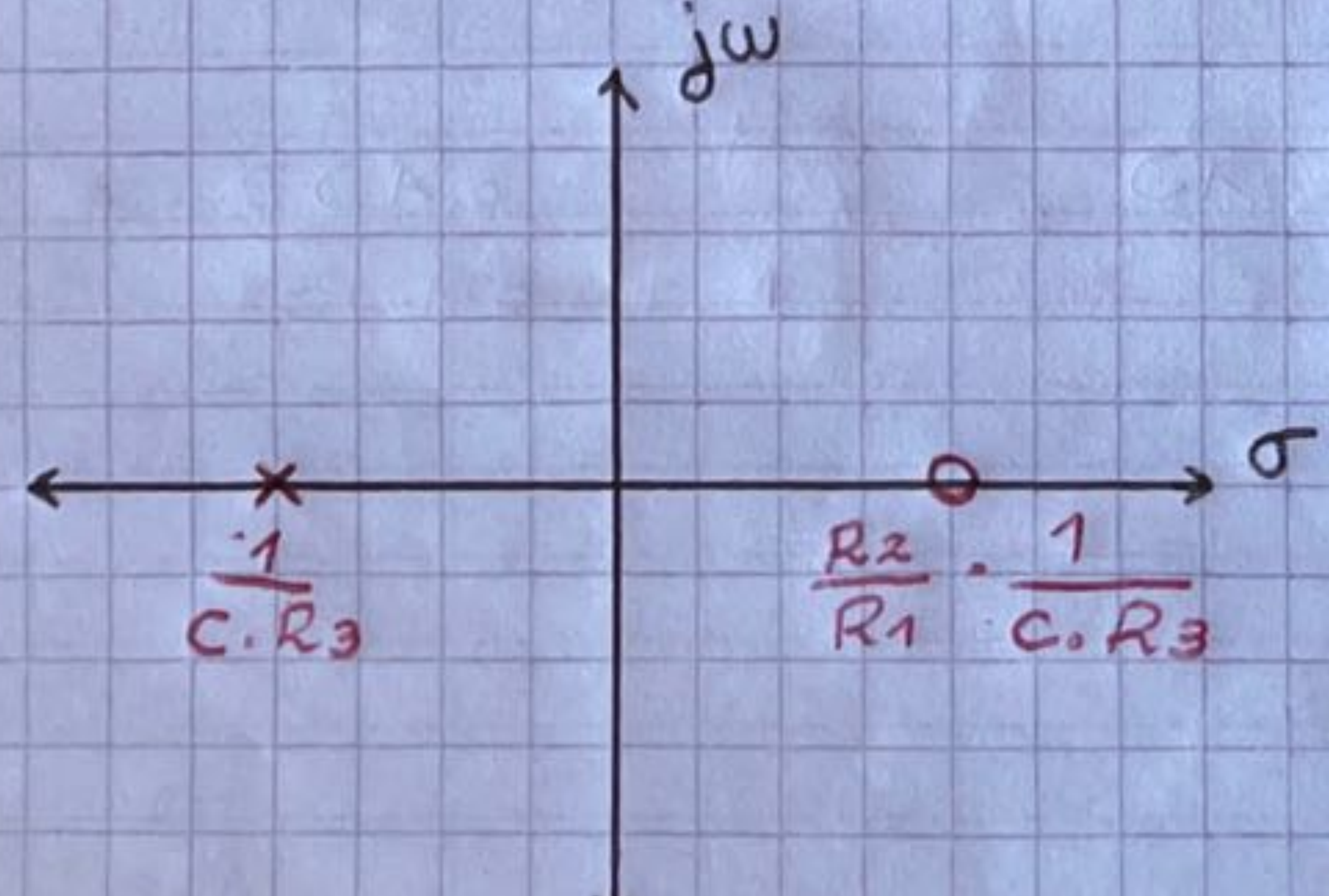
$$V_2 = V_1\left(1 - \frac{R_1 + R_2}{R_1(sCR_3 + 1)}\right) = V_1\left(\frac{R_1(sCR_3 + 1) - R_1 - R_2}{R_1(sCR_3 + 1)}\right)$$

$$V_2 = V_1\left(\frac{sCR_3 + 1 - 1 - R_2/R_1}{sCR_3 + 1}\right)$$

Finalmente:

$$\boxed{\frac{V_2}{V_1} = \frac{sCR_3 - R_2/R_1}{sCR_3 + 1} = \frac{CR_3\,(s - R_2/R_1.CR_3)}{CR_3\,(s + 1/CR_3)} = \frac{s - R_2/R_1.CR_3}{s + 1/CR_3}}$$

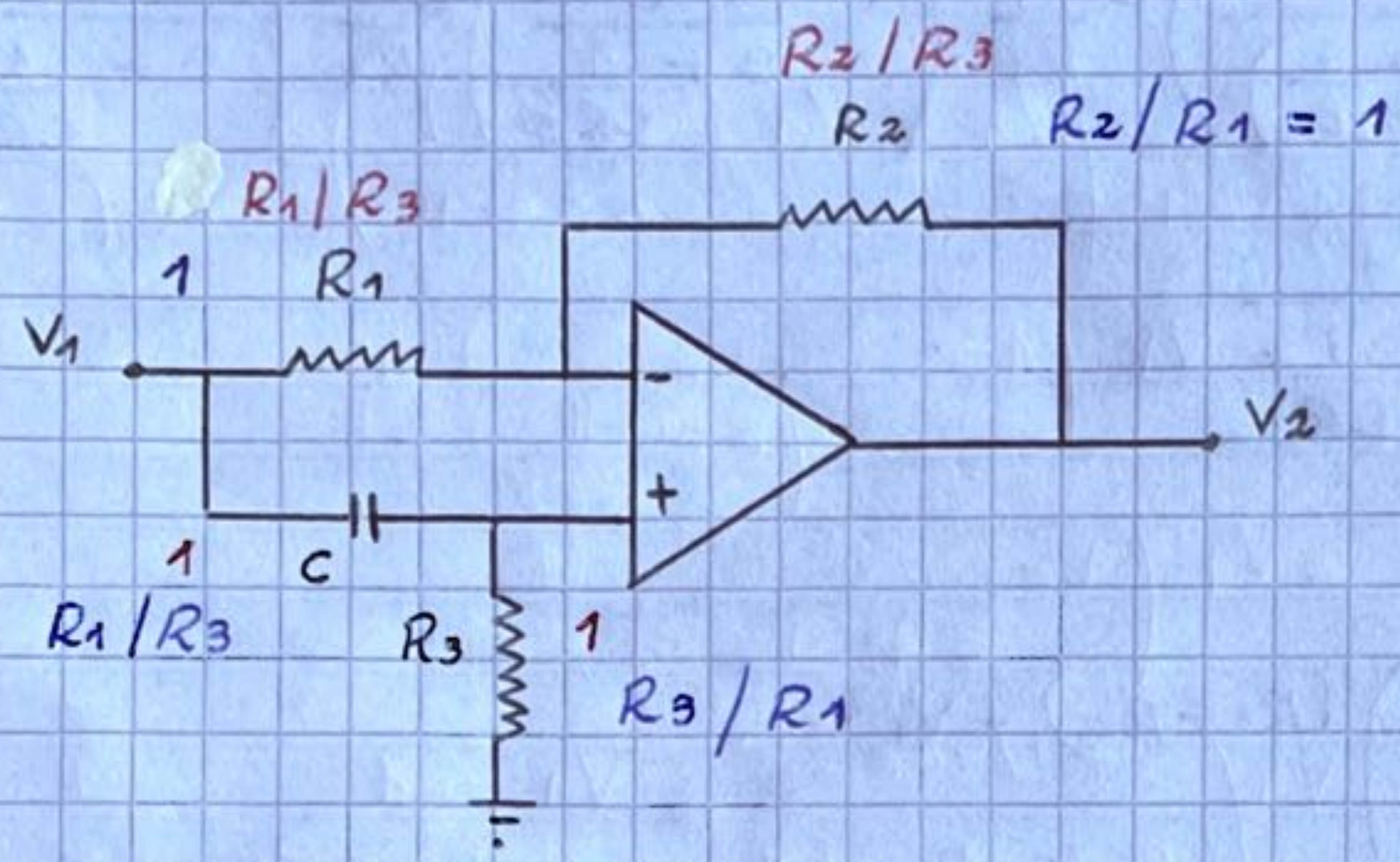
· Diagrama de polos y ceros:



Normalización:

- $\Omega_\omega = \dfrac{1}{R_3 \cdot C}$ $\longrightarrow$ Recordamos que debemos multiplicar por estos parámetros para normalizar.

- $\Omega_z = \rightarrow R_1$, $\searrow R_3$



Recordamos que:

$$\frac{V_2}{V_1} = \frac{SCR_3 + R_2/R_1}{S.CR_3 + 1}$$

Normalizamos: $\quad s' = s/\Omega_\omega \rightarrow s = s' \cdot \Omega_\omega = s' \cdot \dfrac{1}{R_3 . C}$

- $$\frac{V_2}{V_1} = \frac{s' - R_2/R_1}{s' + 1}$$

Y $\quad c' = \Omega_\omega . C \rightarrow C' = \dfrac{1}{R_3 . C} . C = \dfrac{1}{R_3}$

Y en impedancia:

$$\begin{cases} R_1' = R_1/\Omega_z = R_1/R_3 \\ R_2' = R_2/\Omega_z = R_2/R_3 \\ R_3' = R_3/\Omega_z = 1 \\ C'' = C'/\Omega_z = 1/R_3/R_3 = 1 \end{cases}$$

$$\begin{cases} R_1' = R_1/\Omega_z = 1 \\ R_2' = R_2/\Omega_z = R_2/R_1 \\ R_3' = R_3/\Omega_z = R_3/R_1 \\ C'' = C'/\Omega_z = R_1/R_3 \end{cases}$$

NOTA

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HOJA N° 2

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Expresión de módulo y fase:

Partimos de la transferencia: $\frac{V_2}{V_1} = \frac{s - \frac{R_2}{R_1} \cdot \frac{1}{C \cdot R_3}}{s + \frac{1}{C \cdot R_3}}$

· Módulo:

$$\frac{V_2}{V_1}(s)\Bigg|_{s=j\omega} = \frac{j\omega - \frac{R_2}{R_1} \cdot \frac{1}{C \cdot R_3}}{j\omega + \frac{1}{C \cdot R_3}}$$

$$\boxed{\left|\frac{V_2}{V_1}(j\omega)\right|^2 = \frac{\omega^2 + \left(\frac{R_2}{R_1} \cdot \frac{1}{C R_3}\right)^2}{\omega^2 + \left(\frac{1}{C R_3}\right)^2}}$$

· Fase: $\phi(\omega) = \sum_1^m tg^{-1} \frac{\omega \pm \beta_z}{\alpha_z} - \sum_1^{\hat{n}} tg^{-1} \frac{\omega \pm \beta_p}{\alpha_p}$

$$\boxed{\phi(\omega) = tg^{-1}\left(\frac{\omega}{-\frac{R_2}{R_1} \cdot \frac{1}{C \cdot R_3}}\right) - tg^{-1}\left(\frac{\omega}{\frac{1}{C R_3}}\right)}$$

NOTA