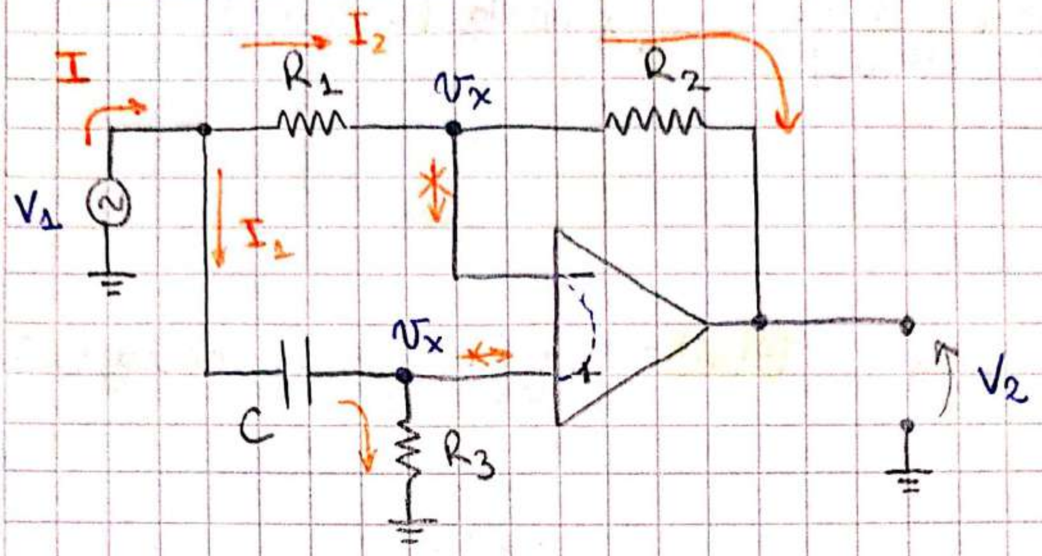
TRABAJO SEMANAL 1



① $$v_x (G_1+G_2) = V_1 \cdot G_1 + V_2 G_2 \quad \text{(I)}$$

$$v_x (G_3 + sC) = V_1 \cdot sC \quad \text{(II)}$$

(II) → (I) $$\frac{V_1 \; sC}{(G_3+sC)} \cdot (G_1+G_2) = V_1 \cdot G_1 + V_2 G_2$$

$$V_1 \left(\frac{sCG_1 + sCG_2}{G_3 + sC} - G_1 \right) = V_2 G_2$$

$$\frac{V_2}{V_1} = \frac{1}{G_2} \cdot \left(\frac{\cancel{sCG_1} + sCG_2 - G_1G_3 - \cancel{sCG_1}}{G_3 + sC} \right)$$

$$\frac{V_2}{V_1} = \frac{\cancel{C} \cdot \cancel{G_2}}{\cancel{G_2} \cdot \cancel{C}} \quad \frac{s - \frac{G_1G_3}{G_2C}}{s + \frac{G_3}{C}}$$

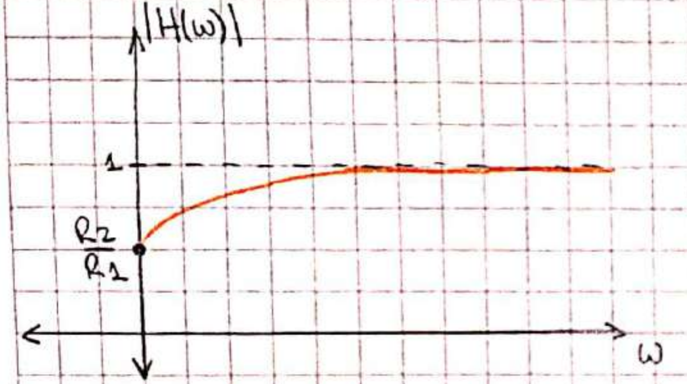
$$\frac{V_2(s)}{V_1(s)} = H(s) = \frac{s - \frac{R_2}{R_1R_3C}}{s + \frac{1}{R_3C}}$$

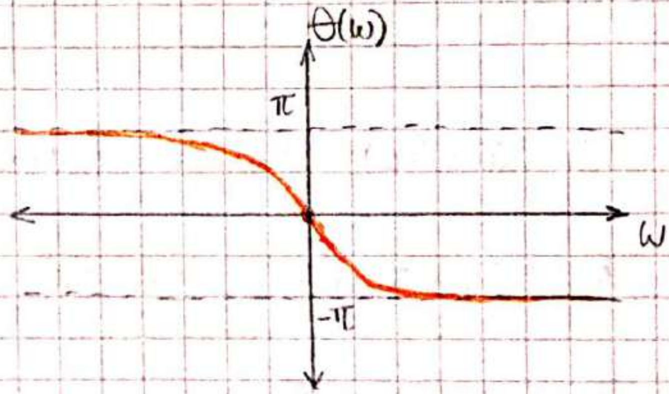
Reemplazo $s \to jw$

$$H(w) = \frac{jw - \frac{R_2}{R_1 R_3 C}}{jw + \frac{1}{R_3 C}} = \frac{\sqrt{w^2 + \left(\frac{R_2}{R_1 R_3 C}\right)^2}}{\sqrt{w^2 + \left(\frac{1}{R_3 C}\right)^2}} \cdot \frac{e^{j\,\mathrm{arctg}\left(-\frac{w \cdot R_1 R_3 C}{R_2}\right)}}{e^{j\,\mathrm{arctg}\,(w R_3 C)}}$$

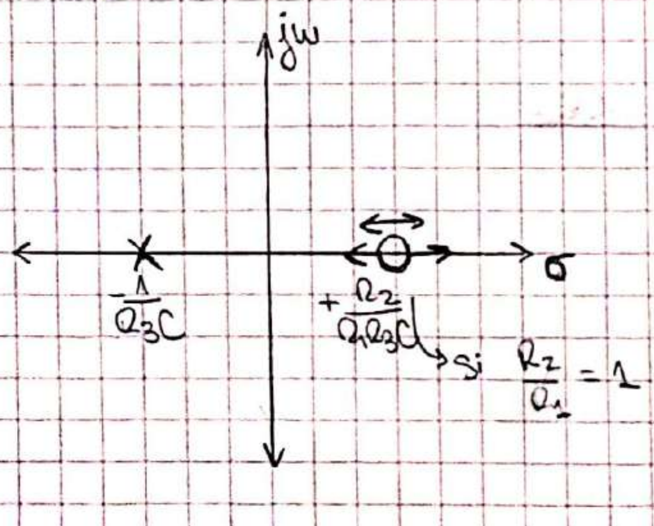
Entonces:

$$|H(w)| = \frac{\sqrt{w^2 + \left(\frac{R_2}{R_1 R_3 C}\right)^2}}{\sqrt{w^2 + \left(\frac{1}{R_3 C}\right)^2}} \quad y \quad \theta(w) = \mathrm{arctg}\left(-\frac{w R_1 R_3 C}{R_2}\right) - \mathrm{arctg}\,(w R_3 C)$$





Polos y Ceros



POLO: $s + \frac{1}{R_3 C} = 0$

$jw = -\frac{1}{R_3 C}$

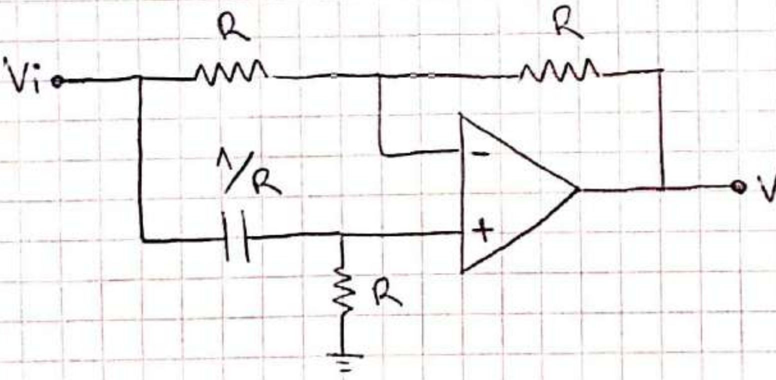
CERO $jw - \frac{R_2}{R_1 R_3 C} = 0 \to jw = \frac{R_2}{R_1 R_3 C}$

TRANSFERENCIA NORMALIZADA

$$H(s) = \frac{s - \frac{R_2}{R_1 R_3 C}}{s + \frac{1}{R_3 C}} \qquad \Omega_w = w_o \quad y \quad w_o = 1/R_3C \qquad \$ = \frac{s}{w_o}$$

$$H(\$) = \frac{\$ \cancel{w_o} - R_2/R_1 \cdot \cancel{w_o}}{\$ \cancel{w_o} + \cancel{w_o}} \Rightarrow H(\$) = \frac{\$ - R_2/R_1}{\$ + 1}$$

Red Normalizada



- Para distintos valores de R obtengo juegos de componentes que responden al diseño de un filtro pasotodo.

$$T(s) = \frac{s - R_2/R_1}{s + 1} \qquad \text{con} \quad w_o = \frac{1}{R_3 C} = 1 \Rightarrow C = \frac{1}{R_3}$$

$$\left.\frac{R_2}{R_1} = 1 \right\} \text{condición del paso todo}$$

$\boxed{R_2 = R_1}$ Elijo $R_1 = 1$ y $R_3 = R_1$

Entonces $\Omega_z = \underset{\downarrow \atop R}{R_1} = 1 \rightarrow R_2 = \Omega_z$, $R_3 = \Omega_z$ $\quad C = \frac{1}{\Omega_z}$