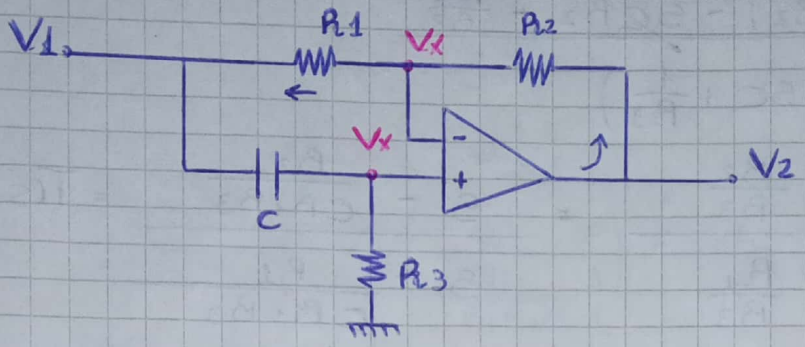
Trabajo semanal 1



$$(V_x - V_1)\left(\frac{1}{SC}\right)^{-1} = I_C$$

$$I_C = -\frac{V_x}{R_3}$$

1 Hallar la función Transferencia $\frac{V_2}{V_1}$

$$(V_x - V_1)\,SC = -\frac{V_x}{R_3}$$

$$SCV_x - SCV_1 = -\frac{V_x}{R_3}$$

$$+SCV_1 = +SCV_x + \frac{V_x}{R_3}$$

$$SC\,V_1 = V_x\left(SC + \frac{1}{R_3}\right) \rightarrow V_x = \frac{SC}{\left(SC + \frac{1}{R_3}\right)} V_1 \quad (I)$$

$$\frac{V_x - V_2}{R_2} = I_{R_2} = \frac{V_1 - V_x}{R_1}$$

$$\frac{V_x}{R_2} - \frac{V_2}{R_2} = \frac{V_1}{R_1} - \frac{V_x}{R_1}$$

$$V_x\left(\frac{1}{R_1} + \frac{1}{R_2}\right) = \frac{V_1}{R_1} + \frac{V_2}{R_2} \quad (II)$$

Igualo I y II $\rightarrow$

$$\frac{SC}{SC + \frac{1}{R_3}}\left(\frac{R_1 + R_2}{R_1 R_2}\right) V_1 = \frac{V_1}{R_1} + \frac{V_2}{R_2}$$

$$\left[\frac{SC\,(R_1 + R_2)}{\left(SC + \frac{1}{R_3}\right) R_1 R_2} - \frac{1}{R_1}\right] R_2 = \frac{V_2}{V_1}$$

$$T(S) = \left[\frac{SC(R_1+R_2)}{\left(SC+\frac{1}{R_3}\right)R_1} - \frac{R_2}{R_1}\frac{\left(SC+\frac{1}{R_3}\right)}{\left(SC+\frac{1}{R_3}\right)} \right]$$

$$T(S) = \frac{SC(R_1+R_2) - SCR_2 + \frac{R_2}{R_3}}{R_1\left(SC+\frac{1}{R_3}\right)}$$

$$T(S) = \frac{SCR_1 - \frac{R_2}{R_3}}{SCR_1 + \frac{R_1}{R_3}} = \frac{S - \frac{R_2}{CR_1R_3}}{S + \frac{R_1}{CR_1R_3}} = T(S)$$

Polos simples

$$T(S) = \frac{S - \frac{R_2}{R_1R_3C}}{S + \frac{1}{R_3C}}$$

frecuencia unitaria $\frac{+1}{R_3C}\left[\frac{1}{S}\right]$

Normalización

$R_1 = R_2$

$\frac{1}{R_3C} = A$

frecuencia normalizada $= \frac{1}{R_3C}$

$$T(S)_N = \frac{S-A}{S+A} \Rightarrow S = A \cdot S' \Rightarrow \frac{AS'-A}{AS'+A} = \frac{A(S'-1)}{A(S'+1)}$$

$$T(S)|_N = \frac{S'-1}{S'+1}$$

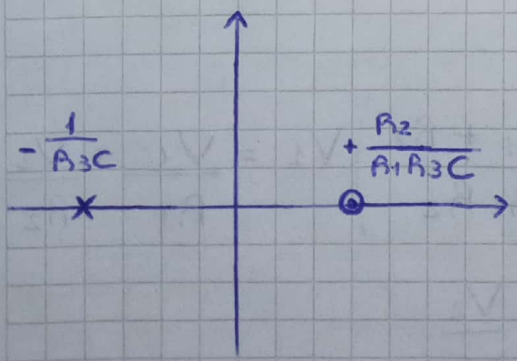


Diagrama de Polos y Ceros

$$|T(S)| = \frac{\sqrt{S^2 + \left(\frac{-R_2}{R_1 R_3 C}\right)^2}}{\sqrt{S^2 + \left(\frac{1}{R_3 C}\right)^2}} = \frac{\sqrt{+\omega^2 + \left(\frac{-R_2}{R_1 R_3 C}\right)^2}}{\sqrt{\omega^2 + \left(\frac{1}{R_3 C}\right)^2}} = |T(\omega)|$$

$$\varphi(T(\omega)) = \varphi_{a(\omega)} - \varphi_{b(\omega)}$$

$$\varphi(T(\omega)) = \operatorname{arctg}\left(\frac{\omega}{\left(\frac{-R_2}{R_1 R_3 C}\right)}\right) - \operatorname{arctg}\left(\frac{\omega}{\frac{1}{C R_3}}\right)$$

$$\varphi(T(\omega)) = \operatorname{arctg}\left(-\frac{R_1 R_3 C \omega}{R_2}\right) - \operatorname{arctg}(\omega C R_3)$$

2. Normalización

$$T(S') = \frac{S' - 1}{S' + 1}$$

La norma de frecuencia por distancia radial al polo es $= \frac{1}{R_3 C}$