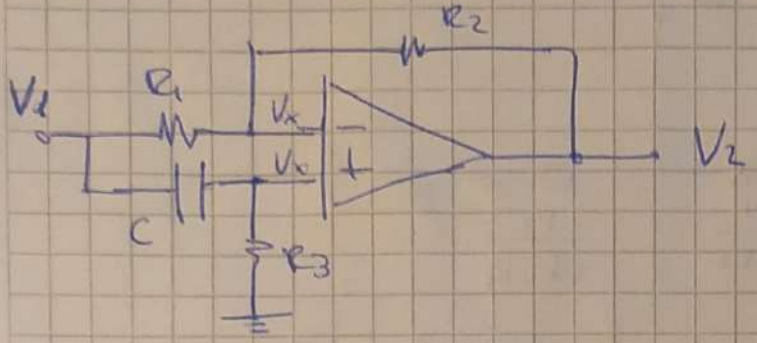
FECHA

TS 1 (ejer 2 TP1)



$V^+ = V^- = V_x$

$I_{R1} = I_{R2}$

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

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

$$\frac{V_1}{R_1} - \frac{V_1}{R_1 + \frac{R_1}{SCR_3}} - \frac{V_1}{R_2 + \frac{R_2}{SCR_3}} = -\frac{V_2}{R_2}$$

$$+V_1\left(-\frac{R_2}{R_1} + \frac{R_2}{R_1 + \frac{R_1}{SCR_3}} + \frac{R_2}{R_2 + \frac{R_2}{SCR_3}}\right) = \frac{V_2}{V_1}$$

$$-\frac{R_2}{R_1} + \frac{R_2}{\frac{SCR_3R_1 + R_1}{SCR_3}} + \frac{1}{\frac{SCR_3 + 1}{SCR_3}} = \frac{V_2}{V_1}$$

$$-\frac{R_2}{R_1} + \frac{SCR_3R_2}{SCR_3R_1 + R_1}$$

$I_C = I_{R3}$

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

$$V_1 SC = V_x\left(\frac{1}{R_3} + SC\right) = V_x\left(\frac{SCR_3 + 1}{R_3}\right)$$

$$V_1 = V_x\left(1 + \frac{1}{SCR_3}\right)$$

$$\frac{V_1}{1 + \frac{1}{SCR_3}} = V_x = V_1 \cdot \frac{SCR_3}{SCR_3 + 1}$$

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

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

$$\frac{V_2}{R_2} = V_1\left[\frac{SCR_3}{SCR_3R_1 + R_1} + \frac{SCR_3}{SCR_3R_2 + R_2} - \frac{1}{R_1}\right]$$

$$\frac{V_2}{V_1} = \frac{SCR_3R_2}{SCR_3R_1 + R_1} + \frac{SCR_3R_1}{SCR_3R_2 + R_2} - \frac{R_2}{R_1}$$

$$\frac{V_2}{V_1} = \frac{SCR_3R_2}{SCR_3R_1 + R_1} + \frac{SCR_3R_1}{SCR_3R_2 + R_2} - \frac{SCR_3R_2 + R_2}{SCR_3R_1 + R_1}$$

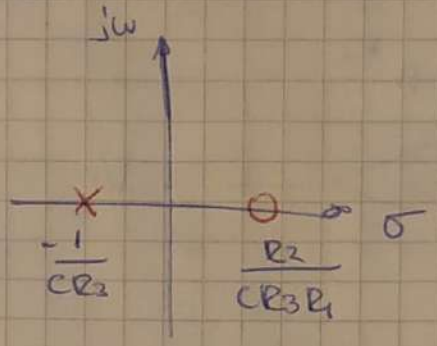
$$\boxed{\frac{V_2}{V_1} = \frac{SCR_3R_1 - R_2}{SCR_3R_1 + R_1} = \frac{S - \frac{R_2}{CR_3R_1}}{S + \frac{1}{CR_3}}}$$

$$T = \frac{V_2}{V_1} = \frac{S - \frac{R_2}{CR_3R_1}}{S + \frac{1}{CR_3}}$$

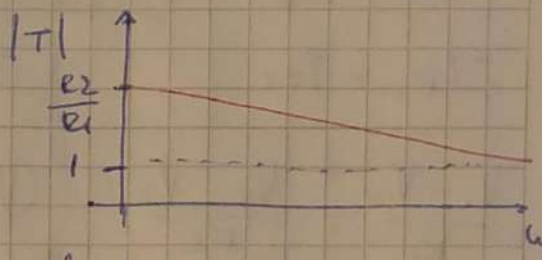
cero: $S = \frac{R_2}{CR_3R_1}$

polo: $S = -\frac{1}{CR_3}$

$$T(j\omega) = \frac{j\omega - \frac{R_2}{CR_3R_1}}{j\omega + \frac{1}{CR_3}}$$

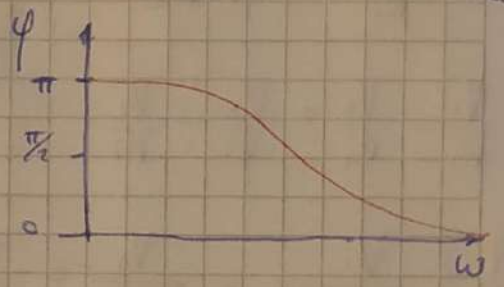


$$|T(j\omega)| = \frac{\sqrt{\omega^2 + \left(\frac{R_2}{CR_3R_1}\right)^2}}{\sqrt{\omega^2 + \left(\frac{1}{CR_3}\right)^2}}$$



$$\varphi(\omega) = \text{arctg}\left(\frac{\omega}{\frac{R_2}{CR_3R_1}}\right) - \text{arctg}\left(\frac{\omega}{\frac{1}{CR_3}}\right)$$

$$\varphi(\omega) = \text{arctg}\left(\frac{\omega CR_3R_1}{R_2}\right) - \text{arctg}(\omega CR_3)$$



2) Transferencia normalizada

$$T = \frac{SCR_3 - \frac{R_2}{R_1}}{SCR_3 + 1} = \frac{\$ - \frac{R_2}{R_1}}{\$ + 1}$$

$$\$ = SCR_3 = \frac{S}{\frac{1}{CR_3}} = \frac{S}{\omega_A}$$

$$\left(\$ = C \cdot \frac{1}{CR_3} = \frac{1}{R_3} = C\omega_A\right)$$

$$\omega_A = \frac{1}{CR_3}$$