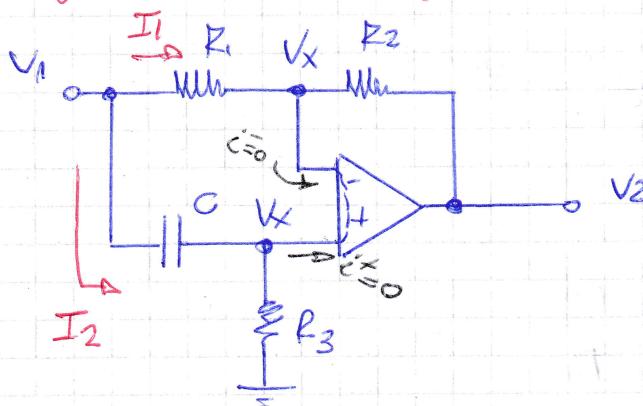


TRABAJO SEMANAL N°1 (TOMÁS A. ACBARNES)



PUNTO (1) Hallar $\frac{V_2}{V_1} = T(s)$ (módulo, fase, dig. de polos y ceros)

$$(1) \quad V_x(s) = V_1(s) \cdot \frac{R_3}{R_3 + \frac{1}{sC}} \quad \text{y} \quad \frac{V_1(s) - V_x(s)}{R_1} = \frac{V_x(s) - V_2(s)}{R_2}$$

$$\frac{V_1(s)}{R_1} - \frac{V_x(s)}{R_1} = \frac{V_x(s)}{R_2} - \frac{V_2(s)}{R_2} \Rightarrow \frac{V_x(s)}{R_2} + \frac{V_x(s)}{R_1} = \frac{V_1(s)}{R_1} + \frac{V_2(s)}{R_2}$$

$$V_x(s) \cdot \left(\frac{R_1 + R_2}{R_1 R_2} \right) = \frac{V_1(s) R_2 + V_2(s) R_1}{R_1 R_2}$$

$$V_x(s) = \frac{V_1(s) R_2 + V_2(s) R_1}{R_1 + R_2} \quad (2)$$

Igualación (1) = (2)

$$V_1(s) \cdot \frac{R_3}{R_3 + \frac{1}{sC}} = \frac{V_1(s) R_2 + V_2(s) R_1}{R_1 + R_2}$$

$$V_1(s) \cdot \frac{s R_3 C}{s R_3 C + 1} - V_1(s) \cdot \frac{R_2}{R_1 + R_2} = V_2(s) \cdot \frac{R_1}{R_1 + R_2}$$

$$V_1(s) \cdot \frac{s R_3 C \cdot (R_1 + R_2) - R_2 (s R_3 C + 1)}{(s R_3 C + 1)(R_1 + R_2)} = V_2 \cdot \frac{R_1}{R_1 + R_2}$$

$$V_1(s) \cdot \frac{SR_1R_3C + SR_2R_3C - R_2}{SR_3C + 1} = V_2(s) \cdot R_1$$

$$V_1(s) \cdot \frac{SR_1R_3C - R_2}{SR_1R_3C + R_1} = V_2(s)$$

$$\frac{V_2(s)}{V_1(s)} = T_V(s) = \frac{SR_1R_3C - R_2}{SR_1R_3C + R_1}$$

$$\frac{V_2(s)}{V_1(s)} = \frac{\frac{R_1R_3C}{R_1R_3C}}{\frac{R_1R_3C}{R_1R_3C}} \cdot \frac{s - \frac{R_2}{R_1R_3C}}{s + \frac{R_1}{R_1R_3C}}$$

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

$$T_V(j\omega) = \left. \frac{V_2(s)}{V_1(s)} \right|_{s=j\omega} = \frac{j\omega - \frac{R_2}{R_1R_3C}}{j\omega + \frac{1}{R_3C}}$$

$$\boxed{|T_V(j\omega)| = \frac{\sqrt{\left(\frac{R_2}{R_1R_3C}\right)^2 + \omega^2}}{\sqrt{\left(\frac{1}{R_3C}\right)^2 + \omega^2}}} \quad \text{modo}$$

$$\boxed{\varphi_{T_V(j\omega)} = \arctg \left(\frac{\omega}{-\frac{R_2}{R_1R_3C}} \right) - \arctg \left(\frac{\omega}{\frac{1}{R_3C}} \right)} \quad \text{FASE}$$

Diagrama de polos y ceros