

Ejercicio 7

$$\textcircled{A} \quad V_x = \frac{V_1}{R_3 + \frac{1}{SC}} R_3$$

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

$$V_1 G_1 - V_x (G_1 + G_2) = -V_2 G_2$$

$$V_1 G_1 - V_x \frac{(G_1 + G_2)}{G_3 \left(\frac{SC R_3 + 1}{SC} \right)} = -V_2 G_2$$

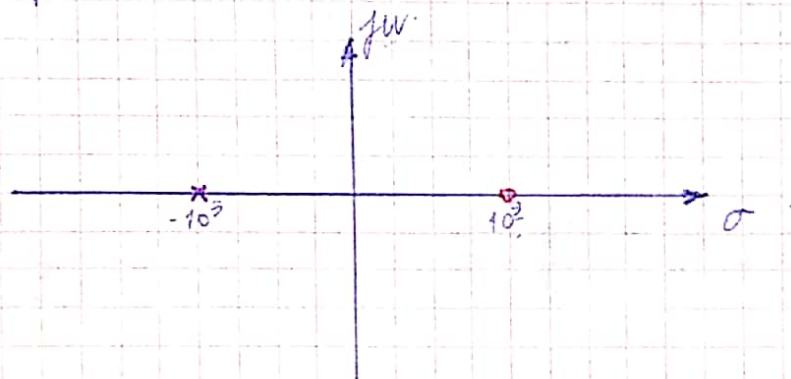
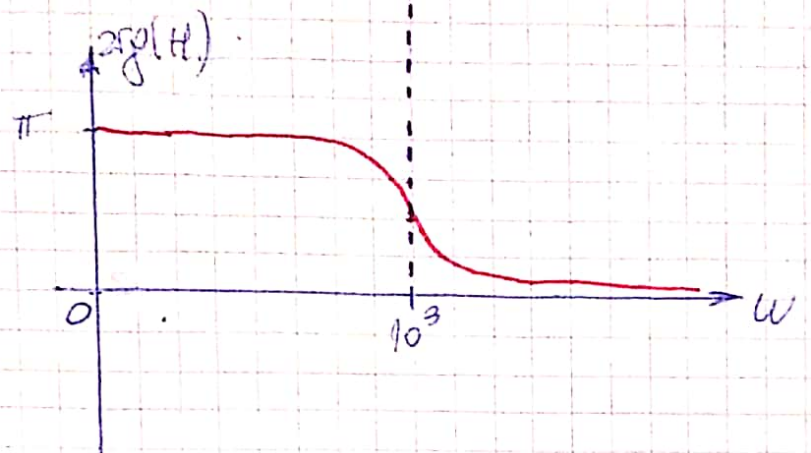
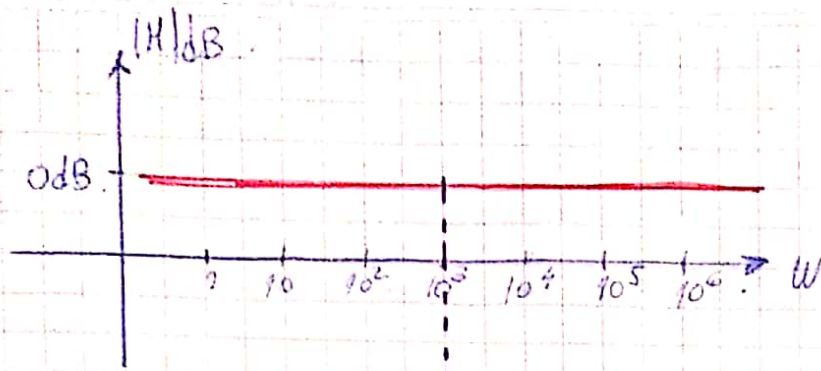
$$\therefore H(s) = \frac{-G_1}{G_2} + \frac{G_1 + G_2}{G_3 G_2 \left(\frac{SC R_3 + 1}{SC} \right)} = \frac{-G_1}{G_2} + \frac{(G_1 + G_2) SC}{G_3 G_2 SC R_3 + G_2 G_3}$$

$$H(s) = \frac{-G_1}{G_2} + \frac{(G_1 + G_2) SC / G_2}{s + \frac{G_3}{C}} = \frac{-\frac{G_1}{G_2} \left(s + \frac{G_3}{C} \right) + s \left(\frac{G_1 + G_2}{G_2} \right)}{s + \frac{1}{R_3 C}}$$

$$H(s) = \frac{-\frac{R_2}{R_1} s - \frac{R_2}{R_1} \cdot \frac{1}{R_3 C} + s (G_1 + G_2) R_2}{s + \frac{1}{R_3 C}} \quad \frac{1}{R_1} + \frac{1}{R_2} = \frac{R_1 + R_2}{R_1 R_2}$$

$$H(s) = \frac{s \left(\frac{R_1 + R_2}{R_1} - \frac{R_2}{R_1} \right) - \frac{R_2}{R_1 R_3 C}}{s + \frac{1}{R_3 C}} \quad \textcircled{A}$$

$$H(s) = \frac{s - \frac{R_2}{R_1} \cdot \frac{1}{R_3 C}}{s + \frac{1}{R_3 C}} = \frac{s - 1000 \text{ Hz}}{s + 1000 \text{ Hz}}$$



- Segundo Circuito:

$$V_x = \frac{z_2}{z_1 + z_2} V_i$$

$$z_1 = R + \frac{1}{sC}$$

$$z_2 = \frac{R/sC}{R + \frac{1}{sC}} = \frac{R}{sCR + 1}$$

$$\frac{V_x - V_2}{R_B} = \frac{V_1 - V_x}{R_A}$$

$$V_x + V_x \frac{R_B}{R_A} - \frac{V_1 R_B}{R_A} = V_2$$

$$V_i \frac{z_2}{z_1 + z_2} \left(1 + \frac{R_B}{R_A} \right) - V_i \frac{R_B}{R_A} = V_0$$

$$H(s) = \frac{z_2}{z_1 + z_2} + \frac{R_B}{R_A} \frac{z_2}{z_1 + z_2} - \frac{R_B}{R_A} = \frac{z_2 + \frac{R_B z_2}{R_A} - \frac{R_B}{R_A} (z_1 + z_2)}{z_1 + z_2}$$

$$H(s) = \frac{z_2 - z_1 \frac{R_B}{R_A}}{z_1 + z_2} = \frac{\frac{R}{sCR+1} - \left(R + \frac{1}{sC} \right) \frac{R_B}{R_A}}{\frac{R}{sCR+1} + R + \frac{1}{sC}}$$

$$H(s) = \frac{R - (sCR+1) \frac{(R sC+1)}{sC} \frac{R_B}{R_A}}{R + R(sCR+1) + \frac{(R sC+1)}{sC}}$$

$$H(s) = \frac{sCR - (sCR+1)^2 \frac{R_B}{R_A}}{sCR + sCR(sCR+1) + sCR+1}$$

$$H(s) = \frac{sCR - [(sCR)^2 + 2sCR+1] \frac{R_B}{R_A}}{(sCR)^2 + 3sCR + 1}$$

$$H(s) = -\frac{R_B}{R_A} \frac{s^2 C^2 R^2 + 2sCR + 1 - \frac{R_A}{R_B} sCR}{(sCR)^2 + 3sCR + 1}$$

$$H(s) = -\frac{R_B}{R_A} \frac{s^2 + s \frac{2CR}{C^2 R^2} + 1/C^2 R^2}{s^2 + s \frac{3CR}{CR^2} + 1/C^2 R^2}$$

$$H(s) = -\frac{R_B}{R_A} \frac{s^2 + s \frac{2}{CR} + 1/C^2 R^2}{s^2 + s \frac{3}{CR} + 1/C^2 R^2}$$

$$H(s) = -5 \frac{s^2 - s(-3000)Hz + 1MHz^2}{s^2 + s(3000)Hz + 1MHz^2}$$

