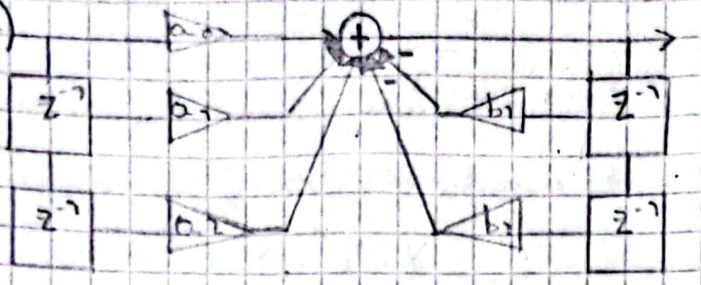
TP5

7) a)

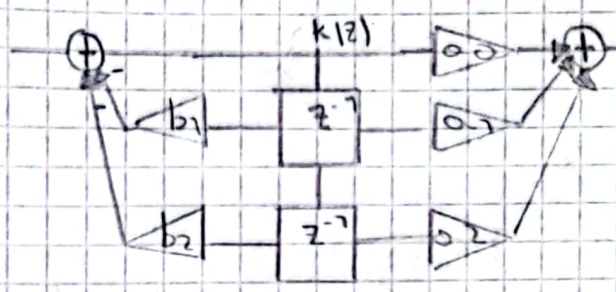


$$Y(z) = (a_0 + a_1 z^{-1} + a_2 z^{-2}) X(z) - (b_1 z^{-1} + b_2 z^{-2}) Y(z)$$

$$Y(z)(1 + b_1 z^{-1} + b_2 z^{-2}) = X(z)(a_0 + a_1 z^{-1} + a_2 z^{-2})$$

$$\frac{Y(z)}{X(z)} = \frac{a_0 + a_1 z^{-1} + a_2 z^{-2}}{1 + b_1 z^{-1} + b_2 z^{-2}} = \frac{a_2 + a_1 z + a_0 z^2}{b_2 + b_1 z + z^2}$$

b)



$$K(z) = X(z) + (b_1 z^{-1} + b_2 z^{-2}) K(z)$$

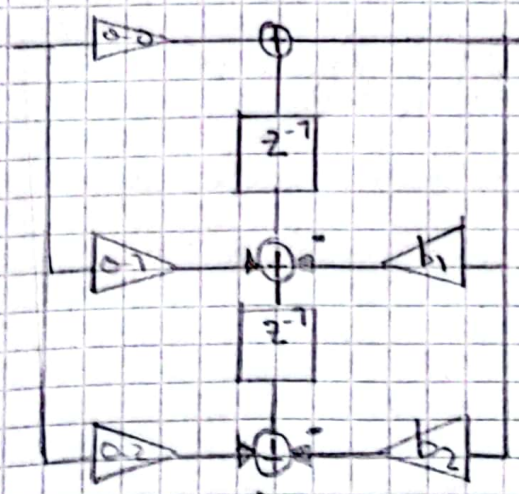
$$K(z)(1 + b_1 z^{-1} + b_2 z^{-2}) = X(z)$$

$$K(z) = \frac{X(z)}{1 + b_1 z^{-1} + b_2 z^{-2}}$$

$$Y(z) = K(z)(a_0 + a_1 z^{-1} + a_2 z^{-2}) \rightarrow Y(z) = X(z) \frac{a_0 + a_1 z^{-1} + a_2 z^{-2}}{1 + b_1 z^{-1} + b_2 z^{-2}}$$

$$H(z) = \frac{Y(z)}{X(z)} = \frac{a_0 z^2 + a_1 z + a_2}{b_2 z^2 + b_1 z + 1}$$

c)



Los tres filtros son de tipo IIR.

$$\left[(X(z)a_2 - Y(z)b_2) z^{-1} + a_1 X(z) - b_1 Y(z)\right] z^{-1} + a_0 X(z) = Y(z)$$

$$X(z)a_2 z^{-2} - Y(z)b_2 z^{-2} + X(z)a_1 z^{-1} - Y(z)b_1 z^{-1} + X(z)a_0 = Y(z)$$

$$X(z)(a_2 z^{-2} + a_1 z^{-1} + a_0) = Y(z)(1 + b_1 z^{-1} + b_2 z^{-2})$$

$$H(z) = \frac{Y(z)}{X(z)} = \frac{a_0 + a_1 z^{-1} + a_2 z^{-2}}{1 + b_1 z^{-1} + b_2 z^{-2}} = \frac{a_0 z^2 + a_1 z + a_2}{b z^2 + b_1 z + b_2}$$

NOTA