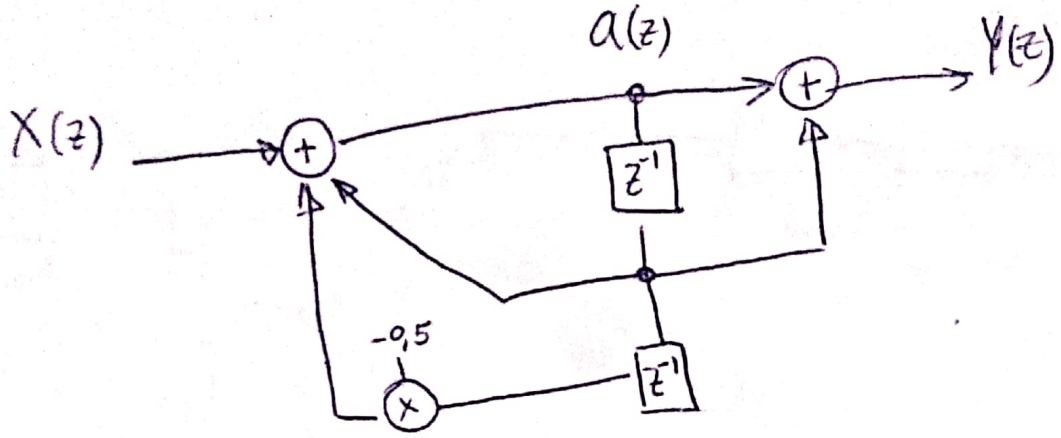
2) b)



$$a(z) = X(z) + a(z).z^{-1} + a(z).z^{-2}.(-0,5)$$

$$Y(z) = a(z) + a(z).z^{-1}$$

$$Y(z) = a(z)\left[1 + z^{-1}\right]$$

$$a(z).\left[1 - z^{-1} + 0,5\,z^{-2}\right] = X(z)$$

$$Y(z) = \frac{X(z)\left[1 + z^{-1}\right]}{1 - z^{-1} + 0,5\,z^{-2}}$$

$$Y(z) = Y(z).z^{-1} - 0,5\,z^{-2}.Y(z) + X(z) + X(z).z^{-1}$$

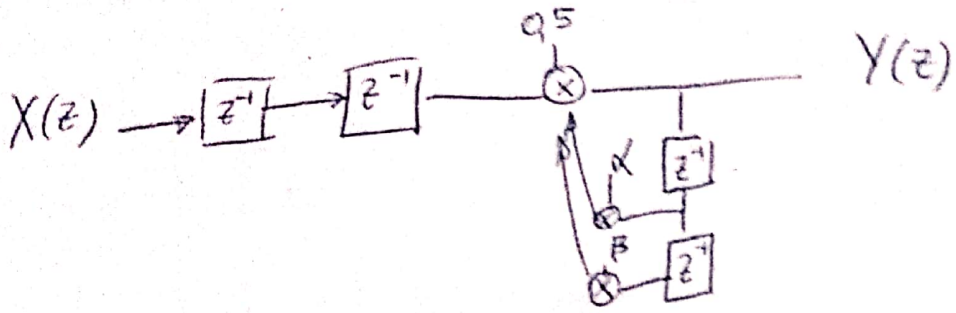
$Y(n)$ CAUSAL $\Rightarrow$ $z[y(n-1)] = z^{-1}\,Y(z)$; $z[y(n-2)] = Y(z).z^{-2}$

$X(n)$ CAUSAL $\Rightarrow$ $z[x(n-1)] = z^{-1}\,X(z)$

$$\boxed{Y(n) = Y(n-1) - 0,5\,Y(n-2) + X(n) + X(n-1)}$$

MISMO RESULTADO.

9)



$$Y(z) = Y(z)\,\alpha\, z^{-1} + Y(z)\, z^{-2}\,\beta + 0{,}5\, X(z)\, z^{-2}$$

$$\frac{Y(z)}{X(z)} = \frac{0{,}5}{z^2 - \alpha z - \beta}$$

POLOS COMPLEJOS CONJUGADOS $\Leftrightarrow \alpha^2 + 4\beta < 0$

⇑ LO CUMPLEN TODOS LOS CASOS

ANALIZO CASO GENERAL:

$$H(z) = \frac{Y(z)}{X(z)} = \frac{0{,}5}{(z - z_1)(z - z_1^*)} = \frac{A}{(z - z_1)} + \frac{B}{(z - z_1^*)}$$

$z_1 = \rho . e^{j\theta}$ $\quad z_1 = a + b.j$ $\quad$ DONDE $A = \frac{0{,}5}{2\,Im(z_1)}$ y $B = -A$

$$\therefore \quad H(z) = A\left(\frac{z}{z - z_1} - \frac{z}{z - z_1^*}\right)\frac{1}{z}$$

$$h(n) = A.\mu(n)\left[z_1^{\,n} - (z_1^*)^n\right] * \delta(n-1)$$

$\rho^n . \operatorname{sen}(\theta n) . 2j$

$$h(n) = \left(\frac{0{,}5}{2\ b\,j}\right) \mu(n).\ \rho^n \operatorname{sen}(\theta n).\ 2j * \delta(n-1)$$

$$h(n) = \left(\frac{0{,}5}{b}\right) \mu(n-1)\, \rho^{n-1} \operatorname{sen}(\theta(n-1))$$

RESPUESTA AL IMPULSO.

RESPUESTA AL ESCALON

$$Y(z) = H(z)\ u(z) = \frac{0,5\ z}{(z-z_1)(z-z_1^*)(z-1)}$$

$$Y(z) = \frac{Cz+D}{(z-z_1)(z-z_1^*)} + \frac{E}{z-1}$$

... CON FRACCIONES SIMPLES SE LLEGA A:

$$E = \frac{0,5}{|1-z_1|^2}$$

$$C = -E$$

$$D = -E \cdot B$$

$$Y(z) = C \cdot \underbrace{\frac{z}{(z-z_1)(z-z_1^*)}}_{\frac{H(z)\cdot z}{0,5}} + D \underbrace{\frac{1}{(z-z_1)(z-z_1^*)}}_{H(z)} + \frac{E \cdot 1}{z-1}\cdot z$$

$$\boxed{Y(n) = C \cdot \frac{h(n+1)}{0,5} + D \cdot \frac{h(n)}{0,5} + E \cdot u(n-1)}$$