1->

$$X(z) = \frac{4z}{(z-1)(z-3)} = \frac{k1}{z-1} + \frac{k2}{z-3}$$

$$4z = k1(z-3) + k2(z-1)$$

Com $z=1$ | Com $z=3$

$4 = -2k1 + 0$ | $12 = 0 + 2k2$

$k_1 = -2$ | $k_2 = 6$

$$\frac{X(z)}{z} = \frac{-2}{z-1} + \frac{6}{z-3} \rightarrow X(z) = \frac{-2}{1}\cdot\frac{z}{z-1} + \frac{6}{1}\frac{z}{z-3}$$

$$X(n) = 2u(n) + 3^n u(n)$$

2-> a-> $$y(k) - \frac{1}{2}y(k-1) = x(k) + \frac{1}{3}x(k-1)$$

$$y(z) - \frac{1}{2}z^{-1}y(z) = x(z) + \frac{1}{3}z^{-1}x(z)$$

$$1 - \frac{1}{2}z^{-1}\cdot y(z) = 1 + \frac{1}{3}z^{-1}x(z)$$

$$H(z) = \frac{z + 1/3}{z - 1/2}$$

b- $y(k) - \frac{3}{4}y(k-1) + \frac{1}{8}y(k-2) = 2x(k)$

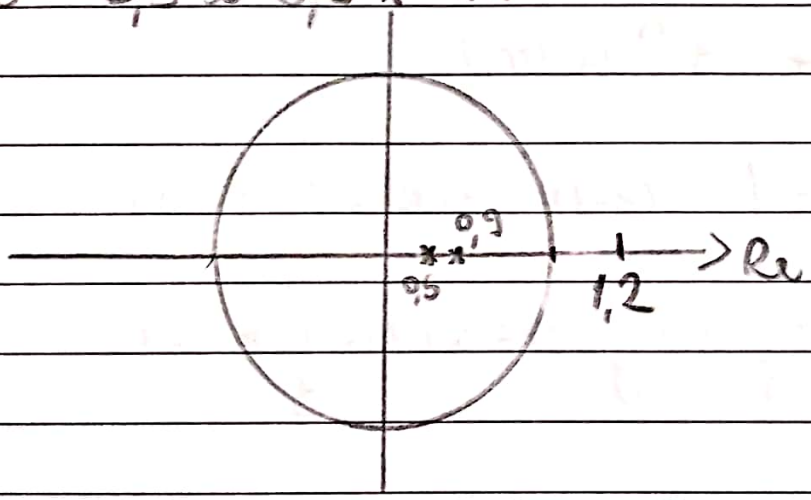
$y(z) - \frac{3}{4}z^{-1}y(z) + \frac{1}{8}z^{-2}y(z) = 2x(z)$

$\frac{y(z)}{x(z)} = \frac{2}{\frac{-3}{4}z^{-1} + \frac{1}{8}z^{-2}}$ $\quad H(z) = \frac{16z^2}{-6z+1}$

3-a- $H(z) = 3\,\frac{z-1,2}{(z-0,5)(z-0,9)}$

Zero = 1,2

Polo = 0,5 e 0,9



$H(n) = \frac{1}{z}\,\frac{3(z-1,2)}{(z-0,5)(z-0,9)} = \frac{A}{z} + \frac{B}{z-0,5} + \frac{C}{z-0,9}$

$A = \frac{z}{z}\,\frac{3(z-1,2)}{(z-0,5)(z-0,9)} \Rightarrow z=0 \Rightarrow \frac{-3,6}{(-0,5)(-0,9)} = -8$

$B = (z-0,5)\frac{1}{z}\,\frac{3(z-1,2)}{(z-0,5)(z-0,9)} \Rightarrow z=0,5 \Rightarrow \frac{1}{0,5}\,\frac{3(0,5-1,2)}{(0,5-0,9)} = 10,5$

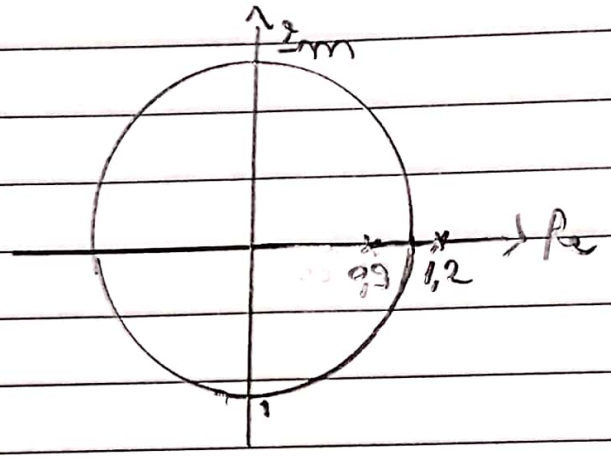
$C = (z-0,9)\,\frac{1}{z}\,\frac{3(z-1,2)}{(z-0,5)(z-0,9)} \Rightarrow z=0,9 \Rightarrow \frac{1}{0,9}\,\frac{3(0,9-1,2)}{(0,9-0,5)} = -2,5$

$$z\left(\frac{-8}{z} + \frac{10,5}{(z-0,5)} - \frac{-2,5}{(z-0,9)}\right)$$

$$-8 + 10,5\,\frac{z}{(z-0,5)} - 2,5\,\frac{z}{(z-0,9)}$$

$$H(n) = -8 + 10,5\,(0,5^n u(n)) - 2,5\,(0,9^n u(n))$$

b- $H(z) = \frac{z}{(z-0,9)(z-1,2)}$



Zero = 0

Polos = 0,9 e 1,2

$$H(n) = \frac{1}{z}\,\frac{z}{(z-0,9)(z-1,2)} = \frac{A}{z-0,9} + \frac{B}{z-1,2}$$

$$A = z = 0,9 \Rightarrow \frac{1}{0,9-1,2} = \frac{1}{-0,3} \text{ ou } -\frac{10}{3}$$

$$B = z = 1,2 \Rightarrow \frac{1}{1,2-0,9} = \frac{1}{0,3} \text{ ou } \frac{10}{3}$$

$$H(n) = z\left(\frac{-10/3}{z-0,9} + \frac{10/3}{z-1,2}\right) = \frac{-10}{3}\,\frac{z}{(z-0,9)} + \frac{10}{3}\,\frac{z}{(z-1,2)}$$

$$H(n) = \frac{10}{3}\left(-0,9^n u(n) + 1,2^n u(n)\right)$$