

NOTA

$$-p_0^{m+1} 1_0(n) \xrightarrow{z} \frac{1}{z^{-1} - 1/p_0}$$

$$(n+1) p_0^{m+2} 1_0(n) \xrightarrow{z} \frac{1}{(z^{-1} - 1/p_0)^2}$$

$P_0 = \text{POLO}$

ES 1

$$x(n) = y(n-2) + y(n-1) - 6y(n)$$

$$x(n) = A$$

$$y(-1) = K_1$$

$$y(-2) = K_2$$

$$h(n) = ?$$

$$y(n) = ?$$

$$H(z) = \frac{1}{z^{-2} + z^{-1} - 6}$$

$$z_{1,2}^{-1} = \frac{-1 \pm \sqrt{1+24}}{2} = \begin{matrix} 2 \\ -3 \end{matrix}$$

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

$$\downarrow$$

$$z^{-1}-2=0$$

$$\downarrow$$

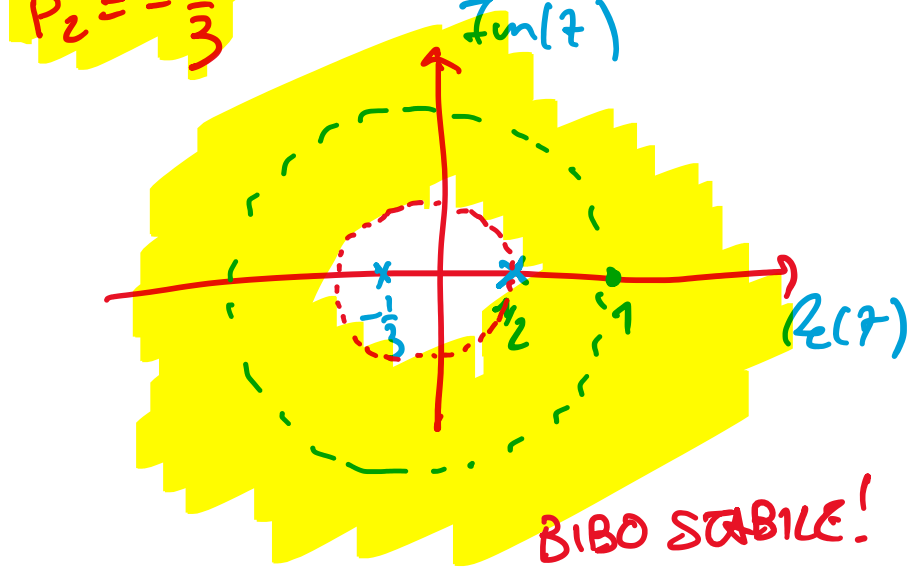
$$z^{-1}=2$$

$$\downarrow$$

$$z = \frac{1}{2}$$

$$\downarrow$$

$$P_1 = \frac{1}{2}$$



$$H(z) = \frac{1}{(z^{-1}-2)(z^{-1}+3)} = \frac{R_0}{z^{-1}-2} + \frac{R_1}{z^{-1}+3}$$

$$R_0 = H(z)(z^{-1}-2) \Big|_{z^{-1}=2} = \frac{1}{z^{-1}+3} \Big|_{z^{-1}=2} = \frac{1}{5}$$

$$R_1 = -\frac{1}{5} = H(z)(z^{-1}+3) \Big|_{z^{-1}=-3} = \frac{1}{z^{-1}-2} \Big|_{z^{-1}=-3} = -\frac{1}{5}$$

$$h(n) = \frac{1}{5} \cdot -\left(\frac{1}{2}\right)^{n+1} 1_0(n) + \frac{1}{5} \cdot +\left(-\frac{1}{3}\right)^{n+1} 1_0(n)$$

$$= -\frac{1}{5} \left(\frac{1}{2}\right)^{n+1} 1_0(n) + \frac{1}{5} \left(-\frac{1}{3}\right)^{n+1} 1_0(n)$$

$$x(n) = y(n-2) + y(n-1) - 6y(n)$$

$$\downarrow z$$

$$X_r(z) = z^{-2} Y_r(z) + z^{-1} y(-1) + y(-2) + z^{-1} Y_r(z) + y(-1) - 6Y_r(z)$$

$$Y_r(z) = \frac{1}{z^{-2} + z^{-1} - 6} X_r(z) = \frac{K_1 + K_2 z^{-1} + z^{-2} K_1}{z^{-2} + z^{-1} - 6}$$

$$x(n) = A$$

$$x_r(n) = A 1_0(n)$$

$$\downarrow z$$

$$X_r(z) = \frac{-A}{z^{-1} - 1}$$

$$-p_0^{m+1} 1_0(n) \rightarrow \frac{1}{z^{-1} - 1/p_0}$$

$$\downarrow p_0=1$$

$$+1_0(n) \rightarrow \frac{-1}{z^{-1} - 1}$$

$$Y_r(z) = H(z) X_r(z) = \frac{-A}{(z^{-1}-2)(z^{-1}+3)(z^{-1}-1)}$$

$$= \frac{R_0}{z^{-1}-2} + \frac{R_1}{z^{-1}+3} + \frac{R_2}{z^{-1}-1}$$

$$R_0 = Y_r(z)(z^{-1}-2) \Big|_{z^{-1}=2} = \frac{-A}{(z^{-1}+3)(z^{-1}-1)} \Big|_{z^{-1}=2} = -\frac{A}{5}$$

$$R_1 = Y_r(z)(z^{-1}+3) \Big|_{z^{-1}=-3} = \frac{-A}{(z^{-1}-2)(z^{-1}-1)} \Big|_{z^{-1}=-3} = -\frac{A}{20}$$

$$R_2 = Y_r(z)(z^{-1}-1) \Big|_{z^{-1}=1} = \frac{-A}{(z^{-1}+3)(z^{-1}-2)} \Big|_{z^{-1}=1} = \frac{A}{4}$$

$$Y_r(z) = +\frac{A}{5} \cdot \left(\frac{1}{2}\right)^{n+1} 1_0(n) + \frac{A}{20} \cdot \left(-\frac{1}{3}\right)^{n+1} 1_0(n) + \frac{A}{4} \cdot -\left(-\frac{1}{2}\right)^{n+1} 1_0(n)$$

$$= \frac{A}{5} \left(\frac{1}{2}\right)^{n+1} 1_0(n) + \frac{A}{20} \left(-\frac{1}{3}\right)^{n+1} 1_0(n) - \frac{A}{4} \left(-\frac{1}{2}\right)^{n+1} 1_0(n)$$

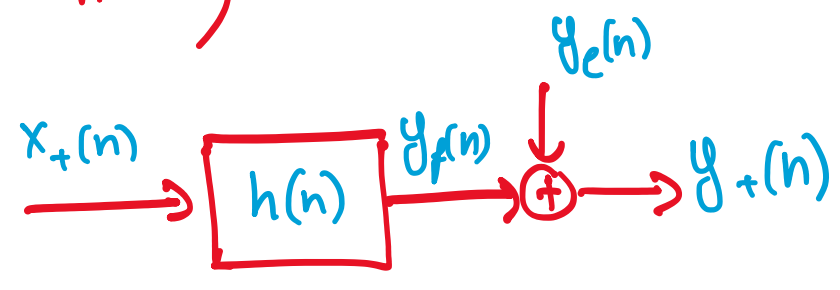
X CASA $y_c(n) = ?$

ES 2

$$h(n) = (1+2n) (-1)^n 1_0(n) + \frac{1}{2} \left(-\frac{1}{2}\right)^n 1_0(n)$$

$$x(n) = \frac{1}{3} \left(-\frac{1}{3}\right)^n 1_0(n)$$

cond. iniziale NULLA ($y(n) = 0 \quad n < 0$)



1) BIBO STABILE NO

2) EQ. A LLE DIFFERENZE

3) EU LIBERA + RISPOSTA FORZATA

H(z)

$$+ (p_0)^{m+1} 1_0(n) \rightarrow \frac{-1}{z^{-1} - p_0}$$

$$(m!) p_0^{m+2} 1_0(n) \rightarrow \frac{1}{(z^{-1} - p_0)^2}$$

$$h(n) = (1+2n) (-1)^n 1_0(n) - \left(\frac{1}{2}\right)^{n+1} 1_0(n)$$

$$= 2 \left((n+1) (-1)^{n+1} 1_0(n) + (-1)^{n+1} 1_0(n) - \left(\frac{1}{2}\right)^{n+1} 1_0(n) \right)$$

$$\downarrow z$$

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

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

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

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

$$H(z) = \frac{3 + z^{-1}}{z^{-3} + 4z^{-2} + 5z^{-1} + 2}$$

$$3x(n) + x(n-1) = y(n-3) + 4y(n-2) + 5y(n-1) + 2y(n)$$