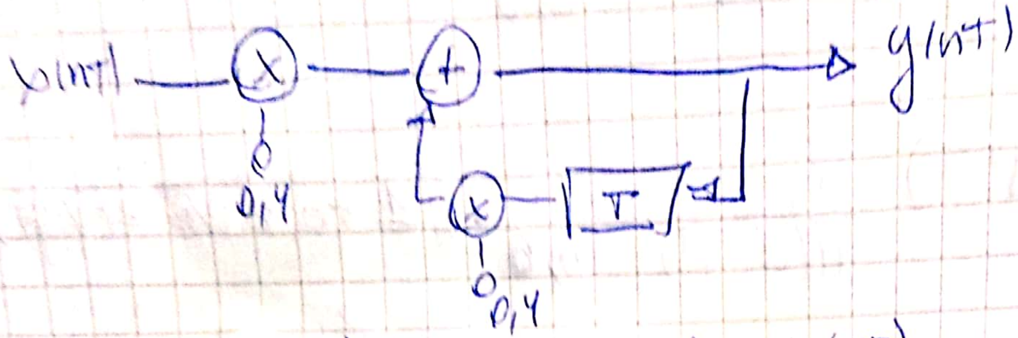
Ejercicio 4)



$$0,4\,x(nT) + 0,4\,y(nT-T) = y(nT)$$

Para hacer fáciles las cuentas, $T=1$, después reemplazo.

$$0,4\,x(n) + 0,4\,y(n-1) = y(n)$$

Quiero obtener resp impulsiva $\Rightarrow$ $x(n) = \delta(n)$

$$0,4\,\delta(n) + 0,4\,y(n-1) = y(n)$$

H) $0,4\,y_H(n-1) = y_H(n)$

Propongo $y_H(n) = \lambda^n A$; $A \in \mathbb{R}$

$$0,4\,\lambda^{n-1} = \lambda^n$$

$$\boxed{0,4 = \lambda}$$

P) $0,4\,\delta(n) + 0,4\,y(n-1) = y(n)$

$$0,4 = y(0)$$

$$\Rightarrow \boxed{h(n) = 0,4^{n+1}\,u(n)}$$

para $x(n) = \cos(nw)B$

Luego, $y(n) = h(n) * x(n) = \sum_{k=0}^{M} h(k)\,x(M-k)$

$$\boxed{y(m) = \sum_{k=0}^{M} 0,4^{k+1}\,B\cos[(n-k)w]}$$

$$\Rightarrow y(m) = \sum_{k=0}^{M} 0,4^{k+1}\,B\cos[(n-k)2\pi f]$$

$$\Rightarrow y(nT) = \sum_{k=0}^{M} 0,4^{(k+1)T}\,B\cos[(n-k)2\pi f T]$$

$$H(z) = \frac{z^2}{z-0,4} \Rightarrow H(e^{i2\pi fT}) = \frac{e^{i4\pi fT}}{e^{i2\pi fT} - 0,4}$$

$$|\tilde{H}(e^{i2\pi fT})| = \sqrt{\frac{1}{1+0{,}4^2-0{,}8\cos(2\pi fT)}}$$

$$\Rightarrow \boxed{|\tilde{H}(1)|} = \frac{1}{1-0{,}4} = \frac{1}{0{,}6} =$$

frecuencia cero

$$\frac{\tilde{H}(1)}{\tilde{H}(e^{i2\pi fT})} = \frac{1}{0{,}6}\cdot\sqrt{1+0{,}4^2-0{,}8\cos(2\pi fT)} = 10^{\frac{3}{20}}$$

$$\left(0{,}6\cdot 10^{3/20}\right)^2 - (1+0{,}4^2) = 0{,}8\cos(2\pi fT)$$

$$-0{,}442 = 0{,}8\cos(2\pi fT)$$

$$123{,}5 = 2\pi fT$$

$$\frac{123{,}5}{2\pi T} = f$$

$$\boxed{19{,}6(KHz) = f}$$