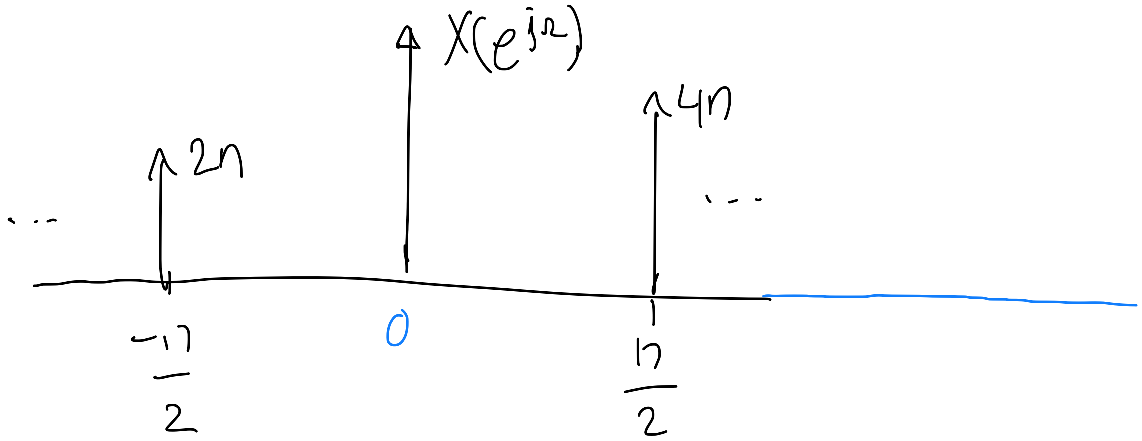
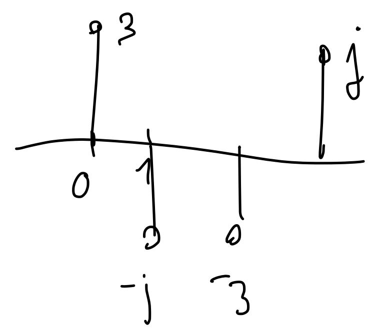
EXAMEN FINAL ASS DICIEMBRE 2018

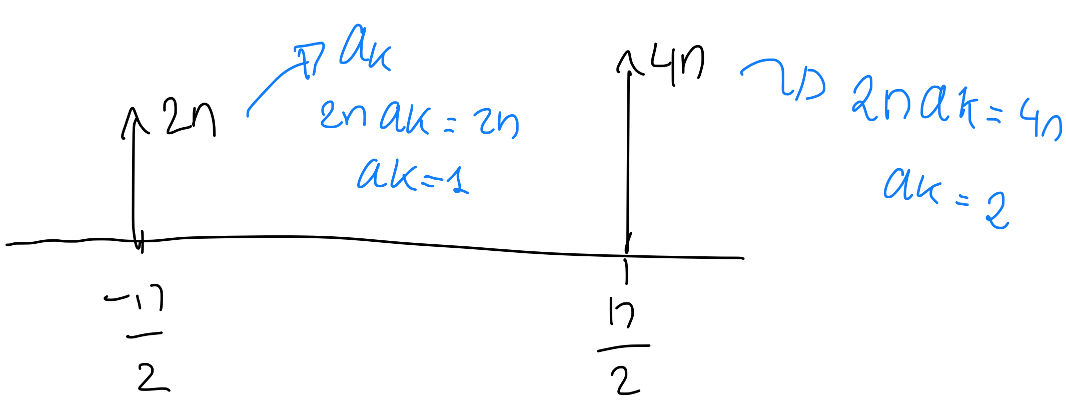


a) $e^{-j\frac{\pi}{2}n} + 2\cdot e^{j\frac{\pi}{2}n}$



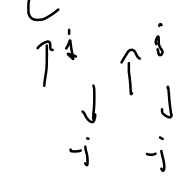
No es ni un seno ni un coseno sí que es imaginaria || Ninguna de las anteriores.

b) $$X(e^{j\Omega}) = 2\pi\,\delta\left(\Omega-\frac{\pi}{2}\right) + 4\pi\,\delta\left(\Omega-\frac{\pi}{2}\right)$$



Es una señal periódica, es un coseno + una exponencial, ambos son periódica, $\Downarrow$

$e^{-j\frac{\pi}{2}n}$



$$P = \sum_{n=-\infty}^{\infty} |x[n]|^2 = \sum_{n=\langle N\rangle} 1^2 + 2^2 = 5$$

$\uparrow$ Parseval

También podría haber hecho:

$\cancel{\frac{1}{N}\sum_{n=0}^{3} |X[n]|^2 = \frac{1}{4}\cdot(1+2^2)\cdot 4 = 5}$

~~Es Desde x[n]~~

c)

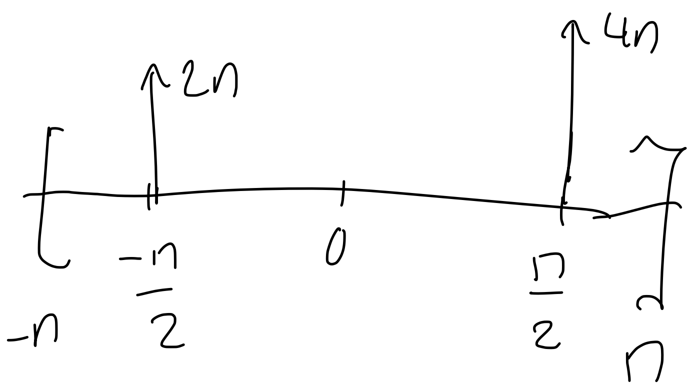
$$\left(2e^{j\frac{\pi}{2}n}+e^{-j\frac{\pi}{2}n}\right) * \left(\delta[n]-\delta[n-3]\right) = y[n] = x[n] * h[n]$$

$$2e^{j\frac{\pi}{2}n}+e^{-j\frac{\pi}{2}n}-2e^{j\frac{\pi}{2}(n-3)}-e^{-j\frac{\pi}{2}(n-3)}$$

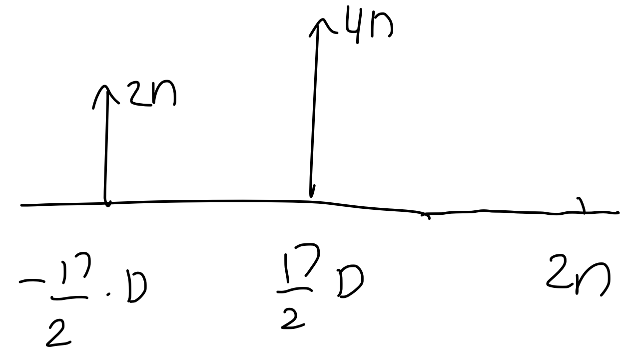
$\hookrightarrow$ DTF: $2\cdot 2\pi\cdot\delta[n-\frac{\pi}{2}] + 2\pi\,\delta[n+\frac{\pi}{2}] - 2\cdot 2\pi\,\delta[$

d) $X[n]$

$W[n] = X(Dn)$

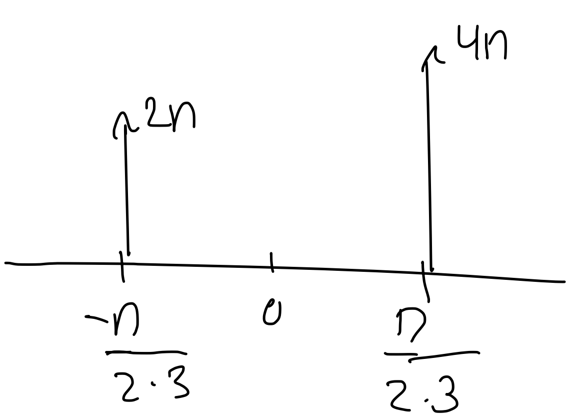


$\Longrightarrow$

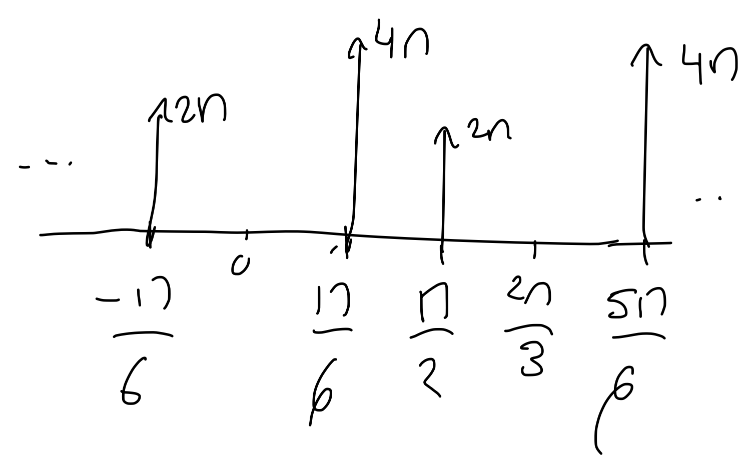


$\frac{\pi}{2} D < \pi \Longrightarrow D < \frac{2\cancel{\pi}}{\cancel{\pi}}$ $\boxed{D < 2}$

e) $z[n] = x[\frac{n}{3}]$



Periódica $\frac{2\pi}{3}$



Ejercicio 2

$f_c = 10 kHz$

$f_s = 80 kHz$

64 muestras

a) ¿Duración en segundos de las muestras?

$$\frac{80000}{64} = 1250 \quad ; \quad T = \frac{1}{1250} = 8 \cdot 10^{-4}$$

b) $$K = \frac{f_c N}{f_s} = \frac{10k \cdot 64}{80k} = 8$$

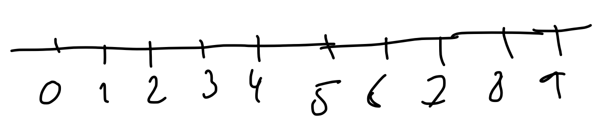
$K_1 = 8$

$\boxed{K_2 = 64 - 8 = 56}$

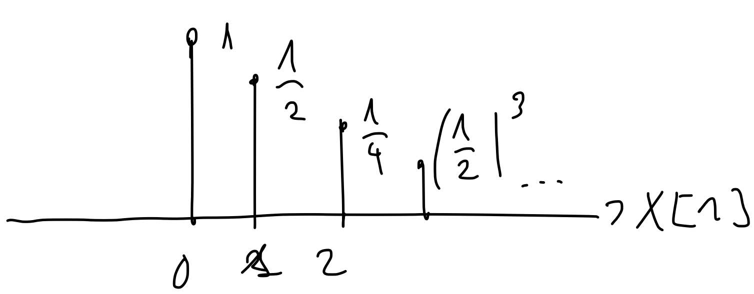
Ejercicio 3

$$x[n] = \left(\frac{1}{2}\right)^n u[n] \xrightarrow{TF} X(e^{j\Omega})$$

$y[n]$



↳ DFT de 10 puntos coincide con el muestreo de $X(e^{j\Omega})$



$y[n]$ será en $n=0$ $1 + x[10] + x[20] \ldots$

en $n=1$ $x[1] + x[11] + x[21] \ldots$

$n=0$

$$\sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^{10n} = \left(\frac{1}{1024}\right)^n \quad \frac{1-0}{1-\frac{1}{1024}} = 1{,}0009775$$

✓

$$n = \sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^{10n+1} = \left(\frac{1}{2}\right)\left(\frac{1}{2024}\right)^{n} = \frac{1}{2} \cdot (1, an) = \frac{1}{2}$$

$$n = \sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^{10n+2} \quad \left(\frac{1}{2}\right)^{2} \left(\frac{1}{1024}\right)^{n} = \frac{1}{4} =$$

$$n = \sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^{10n+3}$$

Ejercicio 4

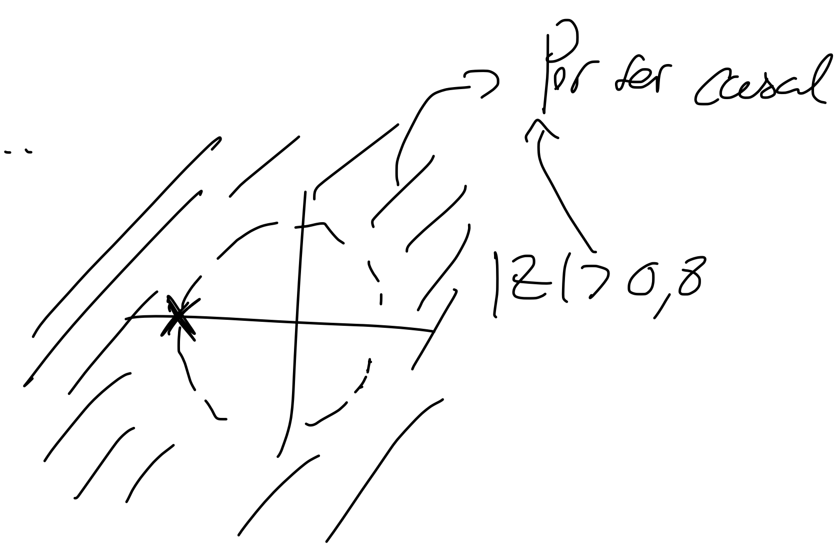
$$y[n] = -0{,}8\, y[n-1] + x[n]$$

a) Función de transferencia.

$$Y(z) = -0{,}8\, Y(z)\, z^{-1} + X(z) \;;\; Y(z)\left(1+0{,}8z^{-1}\right) = X(z)$$

$$H(z) = \frac{Y(z)}{X(z)} = \frac{1}{1+0{,}8z^{-1}}$$

b) Región de convergencia, polos, ceros...



- No tiene ceros

$$1 + \frac{0{,}8}{z} = 0 \Rightarrow \boxed{-0{,}8 = z}$$

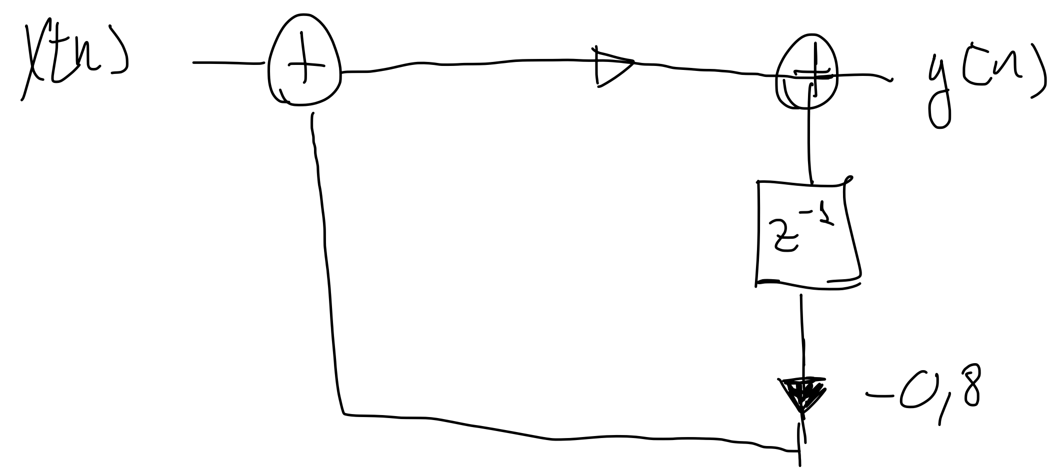
c) Respuesta al impulso:

$$\frac{1}{1+0{,}8z^{-1}} = (-0{,}8)^n\, u[n] \rightarrow \text{sec a derechas}$$

Sabemos que

$$(0{,}8)^n\, u[n] = \frac{1}{1-0{,}8\, z^{-1}}$$

d) Diagrama de bloques del sistema.

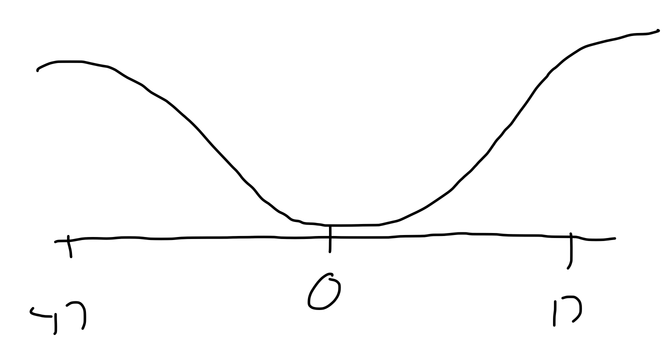


e) $H(e^{j\Omega})$ a partir de la función de transferencia. Determine $|H(e^{j\Omega})|$

$$H(e^{j\Omega}) = \frac{1}{1+0,8\,e^{-j\Omega}} \Rightarrow \text{Proviene de } H(z)\Big|_{z=e^{j\Omega}}$$

$$H(e^{j\Omega})\Big|_{\Omega=\pi} = \frac{1}{1+0,8\cdot \cancel{e^{-j\pi}}^{-1}} = \frac{1}{1-0,8} = 5$$

$$H(e^{j\Omega})\Big|_{\Omega=0} \quad \frac{1}{1+0,8\,\cancel{e^{0}}^{1}} = 0,55$$



f) Es un filtro paso alto
Deja pasar las frecuencias cercanas a π (altas), las otras las hace 0.

g) $y[n] = 0,8\,y[n-1] + x[n]$

$$Y(z)(1-0,8\,z^{-1}) = X(z) \qquad H(z) = \frac{Y(z)}{X(z)} = \frac{1}{1-0,8\,z^{-1}}$$

$$H(z)\Big|_{z=e^{j\Omega}} = \frac{1}{1-0{,}8e^{-j\Omega}}$$

$$\text{Con } \Omega = \pi \Rightarrow \frac{1}{1+0{,}8} = 0{,}55$$

$$\text{Con } \Omega = 0 \Rightarrow \frac{1}{1-0{,}8} = 5$$

Sería un filtro paso bajo