

15/12/2020

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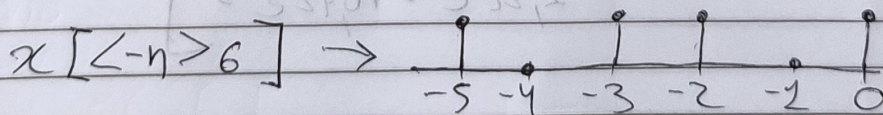
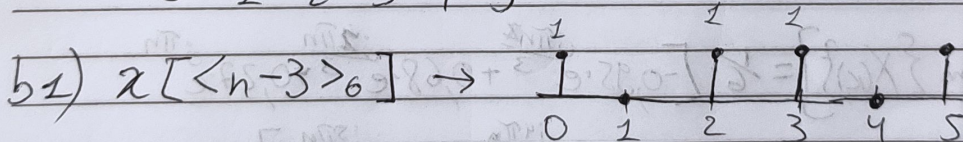
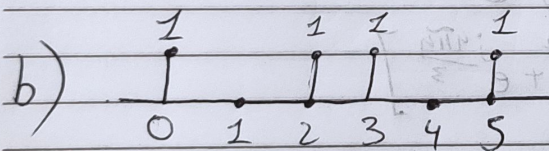
P2 - DSP

$$a) x_2[n] = x_1[\langle n-4 \rangle_8]$$

↓  
Circulados 8 primeiros pontos (último ponto fixo)

Pela propriedade DFT de deslocamento circular:

$$\begin{aligned} x_2[n] &\Rightarrow X_2[k] = W_8^{k \cdot 4} \cdot X_1[k] \\ &= e^{-jK \cdot \left(\frac{2\pi}{8}\right) \cdot 4} \cdot X_1[k] \\ &= e^{-jK\pi} \cdot X_1[k] \end{aligned}$$





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b<sub>2</sub>) IDFT  $\text{Re}\{X[k]\} \quad ; \quad \text{Im}\{X[k]\}$

$$X[k] = \sum_{n=0}^{N-1} x[n] \cdot e^{-j \frac{2\pi}{N} kn} = \sum_{n=0}^5 x[n] \cdot e^{-j \frac{\pi}{3} kn}$$

$$= 1 + e^{-j \frac{\pi}{3} k 2} + e^{-j \pi k} + e^{-j \frac{\pi}{3} k 5}$$

$$= 1 + e^{-j \frac{2\pi}{3} k} + e^{-j \pi k} + e^{-j \frac{5\pi}{3} k}$$

$$\text{Re}\{X(k)\} = 1 + \cos\left(-\frac{2\pi}{3}k\right) + \cos(-\pi k) + \cos\left(-\frac{5\pi}{3}k\right)$$

$$\text{Im}\{X(k)\} = \sin\left(-\frac{2\pi}{3}k\right) + \sin(-\pi k) + \sin\left(-\frac{5\pi}{3}k\right)$$

$$\text{IDFT}[\text{Re}\{X(k)\}] = \frac{1}{N} \cdot \sum_{k=0}^{N-1} X(k) \cdot e^{j \frac{2\pi}{N} kn}$$

$$= \frac{1}{6} \cdot \sum_{k=0}^5 X(k) \cdot e^{j \frac{\pi}{3} kn}$$

$$= \frac{1}{6} \cdot \left[ 4 + e^{j \frac{2\pi}{3} n} + e^{j \frac{4\pi}{3} n} \right]$$

$$\text{IDFT}[\text{Im}\{X(k)\}] = \frac{1}{6} \cdot \left[ -0,95 \cdot e^{j \frac{\pi}{3} n} + 0,68 \cdot e^{j \frac{2\pi}{3} n} + 0,27 \cdot e^{j \pi n} - 1,22 \cdot e^{j \frac{4\pi}{3} n} + 0,42 \cdot e^{j \frac{5\pi}{3} n} \right]$$

