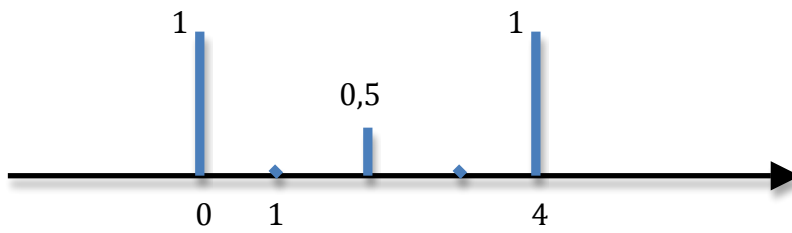


Calcolare la TDF della sequenza finita in figura e disegnare lo spettro di ampiezza



$$X_k = \frac{1}{N} \sum_{n=0}^{N-1} x[n] e^{j2\pi k \frac{n}{N}} = \frac{1}{5} \sum_{n=0}^4 x[n] e^{j2\pi k \frac{n}{5}} = \frac{1}{5} \left[ 1 + 0.5e^{j\frac{4\pi k}{5}} + e^{j\frac{8\pi k}{5}} \right]$$

volendo, in questo caso, è possibile ottenere una forma più leggibile

$$\begin{aligned} X_k &= \frac{1}{5} \left[ 1 + 0.5e^{j\frac{4\pi k}{5}} + e^{j\frac{8\pi k}{5}} \right] = \frac{1}{5} e^{j\frac{4\pi k}{5}} \left[ e^{-j\frac{4\pi k}{5}} + 0.5 + e^{j\frac{4\pi k}{5}} \right] = \\ &= \frac{1}{5} e^{j\frac{4\pi k}{5}} \left[ 0.5 + 2 \cos\left(\frac{4\pi k}{5}\right) \right] \end{aligned}$$

$$X_0 = \frac{1}{5} [0.5 + 2] = 0.3$$

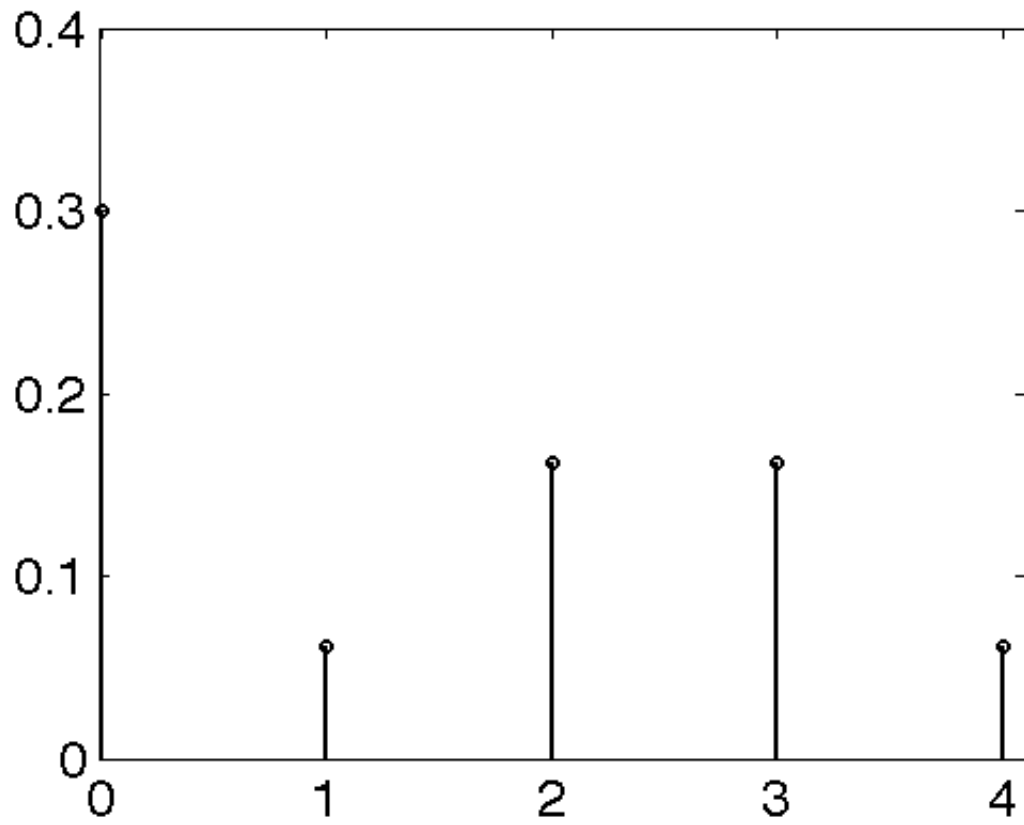
$$X_1 = \frac{1}{5} e^{j\frac{4\pi}{5}} \left[ 0.5 + 2 \cos\left(\frac{4\pi}{5}\right) \right] = 0.05 - 0.0363j = 0.0618e^{-0.6283}$$

$$X_2 = \frac{1}{5} e^{j\frac{8\pi}{5}} \left[ 0.5 + 2 \cos\left(\frac{8\pi}{5}\right) \right] = 0.05 - 0.1539j = 0.1618e^{-1.2566}$$

$$X_3 = \frac{1}{5} e^{j\frac{12\pi}{5}} \left[ 0.5 + 2 \cos\left(\frac{12\pi}{5}\right) \right] = 0.05 + 0.1539j = 0.1618e^{1.2566}$$

$$X_4 = \frac{1}{5} e^{j\frac{16\pi}{5}} \left[ 0.5 + 2 \cos\left(\frac{16\pi}{5}\right) \right] = 0.05 + 0.0363j = 0.0618e^{0.6283}$$

$|X_k|$



$\angle X_k$

