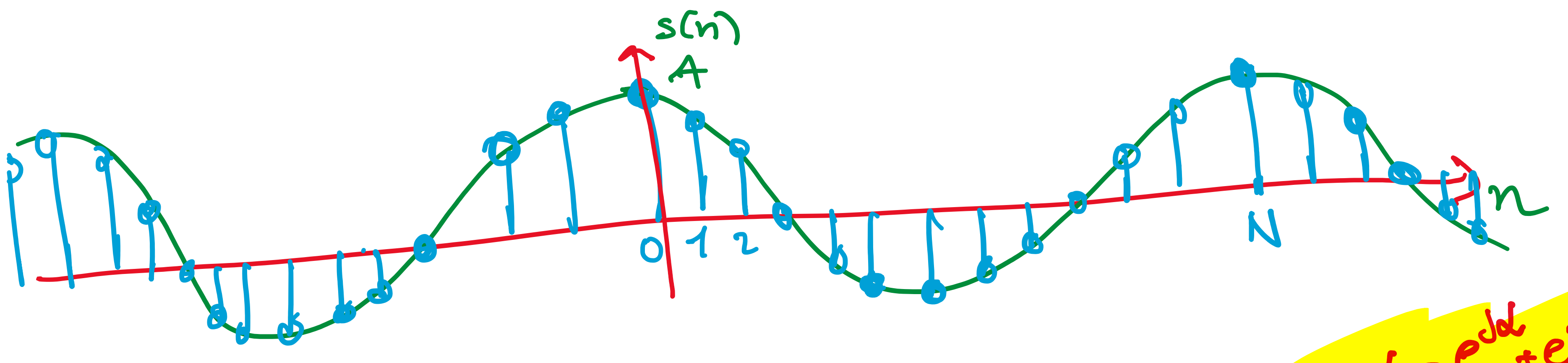
Le6

Wednesday, 8 March 2023 23:19

Es 1.3

$s(n) = A\cos(2\pi f_0 n T)$ periodica N ovvero $f_0 N T = K$ intero

CALCOLARE $A_s(N), m_s, E_s(N), P_s$



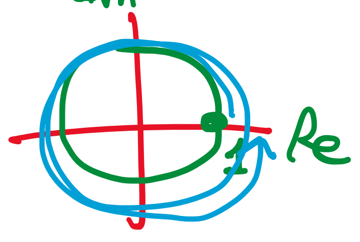
$$A_s(N) = \sum_{n=0}^{N-1} A\cos(2\pi f_0 T\cdot n)$$

$$\cos\alpha = \frac{e^{j\alpha}+e^{-j\alpha}}{2}$$ EULERO

$$= \sum_{n=0}^{N-1} \frac{A}{2}\underbrace{\left(e^{j2\pi f_0 T}\right)^n}_{\alpha^n} + \frac{A}{2}\underbrace{\left(e^{-j2\pi f_0 T}\right)^n}_{\beta^n}$$

$$= \frac{A}{2}\,\frac{1-\cancel{\alpha^N}\,1}{1-\alpha} + \frac{A}{2}\,\frac{1-\cancel{\beta^N}\,1}{1-\beta} = 0$$

$$e^{j2\pi f_0 T N} = e^{j2\pi K} = 1$$



$$e^{-j2\pi f_0 T N} = e^{-j2\pi K} = 1$$

$A_s(N) = 0$ $\quad m_s = 0$

$$|s(n)|^2 = A^2\cos^2(2\pi f_0 n T)$$

$$= \frac{A^2}{2} + \frac{A^2}{2}\cos(2\pi\cdot 2f_0 T\cdot n)$$

SICURAMENTE PERIODICO N

$$E_s(N) = \frac{A^2}{2}\cdot N + \frac{A^2}{2}\cdot 0$$

$$P_s = \frac{E_s(N)}{N} = \frac{A^2}{2}$$

Es 1.4

$s(n) = e^{j2\pi f_0 n T}$ con f_0 generico $f_0 \neq 0$

CALCOLARE m_s, P_s

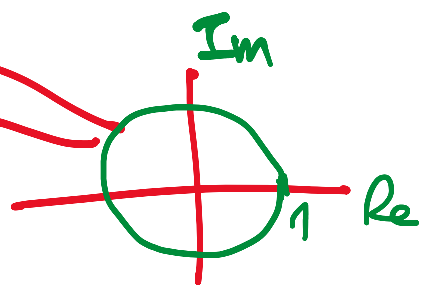
$$m_s = \lim_{N\to\infty} \frac{\sum_{n=-N}^{N} s(n)}{1+2N}$$

$$\sum_{n=-N}^{N} \underbrace{\left(e^{j2\pi f_0 T}\right)^n}_{\alpha^n} = \sum_{n=-N}^{N} \alpha^n$$

$$= \sum_{K=0}^{2N} \alpha^{K-N} = \alpha^{-N}\sum_{K=0}^{2N}\alpha^K$$

$$= \alpha^{-N}\cdot\frac{1-\alpha^{2N+1}}{1-\alpha} \qquad \alpha = e^{j2\pi f_0 T}$$

$$\boxed{m_s = \lim_{N\to\infty} \frac{\alpha^{-N}(1-\alpha^{2N+1})}{(1-\alpha)(1+2N)}}$$



$m_s = 0$

$$|s(n)|^2 = |e^{j2\pi f_0 n T}|^2 = 1$$

$P_s = 1$

se $s(n) = Ae^{j2\pi f_0 n T} \rightarrow$ $m_s = 0$, $P_s = |A|^2$