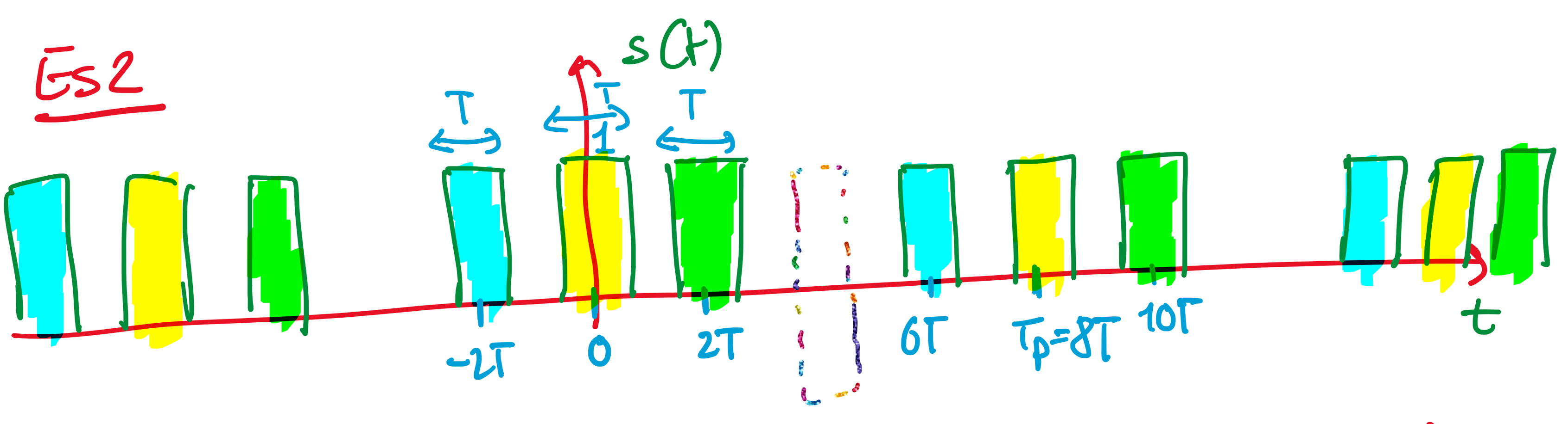
Le14

Wednesday, 10 April 2024 22:24

Es2



$S_K = ?$

$$s(t) = \underbrace{\text{rep}_{8T}\,\text{rect}\left(\frac{t}{T}\right)}_{u(t)\ \text{onda quadra}} + \overbrace{\text{rep}_{8T}\,\text{rect}\left(\frac{t-2T}{T}\right)}^{u(t-2T)} + \underbrace{\text{rep}_{8T}\,\text{rect}\left(\frac{t+2T}{T}\right)}_{u(t+2T)}$$

$d = \frac{T}{8T} = \frac{1}{8}$

$U_K = d\,\text{sinc}(Kd) = \frac{1}{8}\,\text{sinc}\left(\frac{K}{8}\right)$

$\omega_0 = \frac{2\pi}{T_p} = \frac{2\pi}{8T} = \frac{\pi}{4T}$

$$s(t) = u(t) + u(t-2T) + u(t+2T)$$

$\mathcal{F}\downarrow$ regola trasl.

$$S_K = U_K + U_K e^{-jK\omega_0 \cdot 2T} + U_K e^{+jK\omega_0 \cdot (+2T)}$$

$$= U_K\left(1 + 2\cos\left(K\,\cancel{\omega_0}^{\pi/\cancel{4T}2}\cdot \cancel{2T}\right)\right)$$

$$= U_K\left(1 + 2\cos(K\pi/2)\right)$$

$$= \frac{1}{8}\,\text{sinc}\left(\frac{K}{8}\right)\left(1 + 2\cos(K\pi/2)\right)$$

REALE E PARI !!

Es 1c

$$s(t) = \cos(\omega_0 t + \varphi_0)$$

$$= \underbrace{\frac{e^{j\varphi_0}}{2}}_{\text{SEGNALE COSTANTE}} \underbrace{e^{j\omega_0 t}}_{\text{MODULAZIONE}} + \frac{e^{-j\varphi_0}}{2} e^{-j\omega_0 t}$$

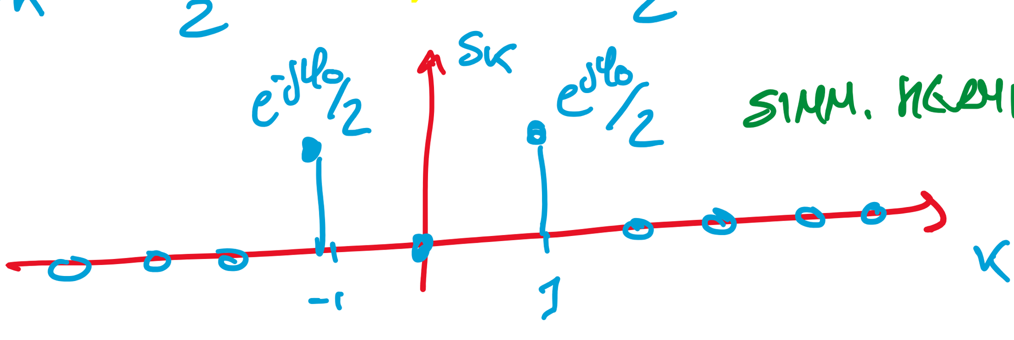
$\mathcal{F}\downarrow$ $\frac{e^{j\varphi_0}}{2}\delta(K)$

$e^{jm\omega_0 t}$ $m=1$

$m=-1$

$\mathcal{F}$ $\frac{e^{-j\varphi_0}}{2}\delta(K)$

$$S_K = \frac{e^{j\varphi_0}}{2}\delta(K-1) + \frac{e^{-j\varphi_0}}{2}\delta(K+1)$$



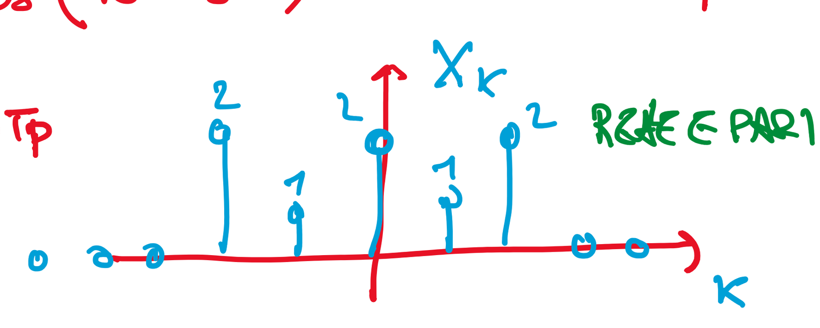
SIMM. HERMITIANA

Es 1d

$$s(t) = x(t)\cos(10\,\omega_0 t) \qquad \omega_0 = 2\pi/T_p$$

REALE E PARI

PERIODICO Tp



REALE E PARI

$x(t) = ?$

$S_K = ?$

$$x(t) = \sum_K X_K e^{jK\omega_0 t} \quad \text{SERIE DI FOURIER}$$

$$= 2 + e^{j\omega_0 t} + e^{-j\omega_0 t} + 2e^{j2\omega_0 t} + 2e^{-j2\omega_0 t}$$

$$= 2 + 2\cos(\omega_0 t) + 4\cos(2\omega_0 t)$$

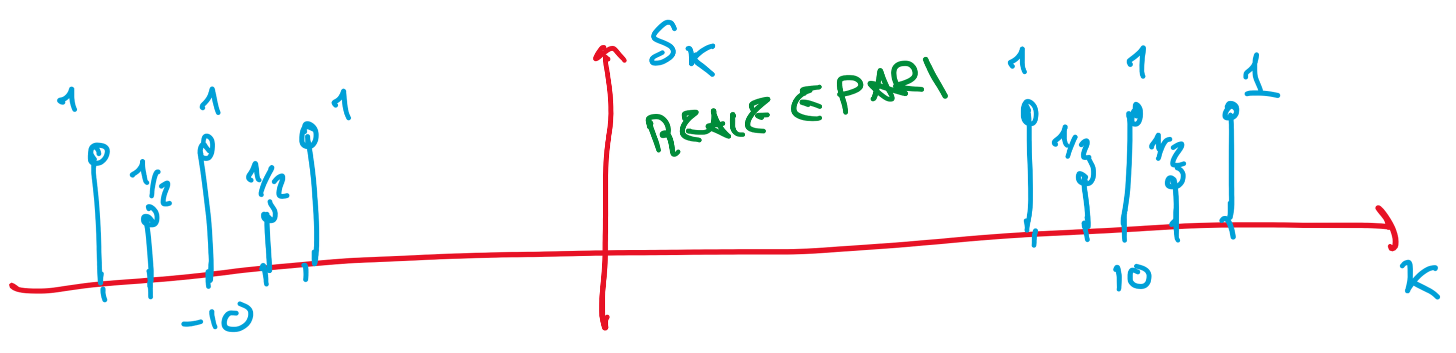
$$s(t) = x(t)\cos(10\,\omega_0 t)$$

$$= \frac{1}{2}x(t)\underbrace{e^{j10\omega_0 t}}_{\text{MODULAZ.}} + \frac{1}{2}x(t)\underbrace{e^{-j10\omega_0 t}}_{m=-10}$$

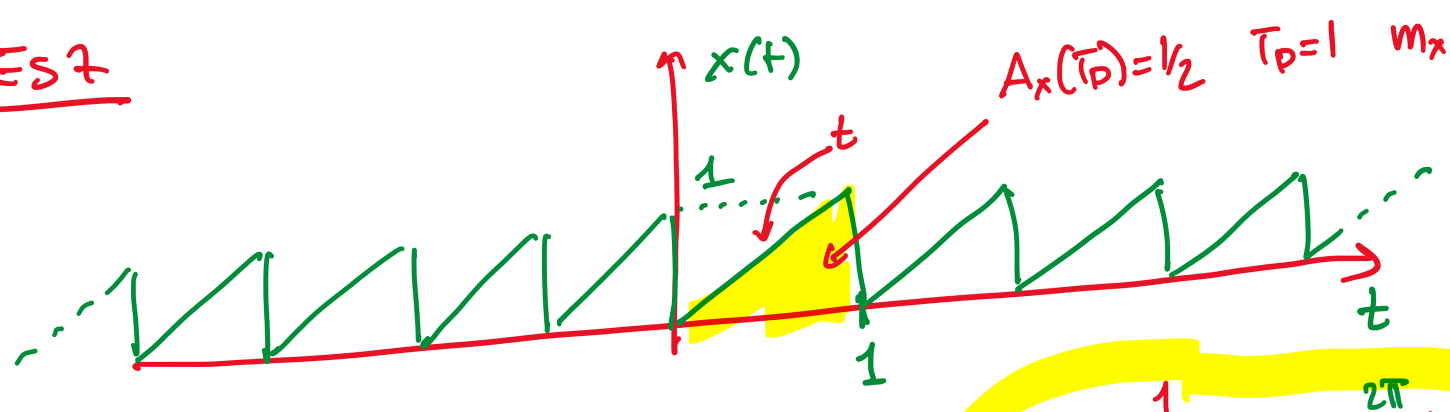
$e^{jm\omega_0 t}$ $m=10$

$\mathcal{F}\downarrow$

$$S_K = \frac{1}{2}X_{K-10} + \frac{1}{2}X_{K+10}$$



Es7

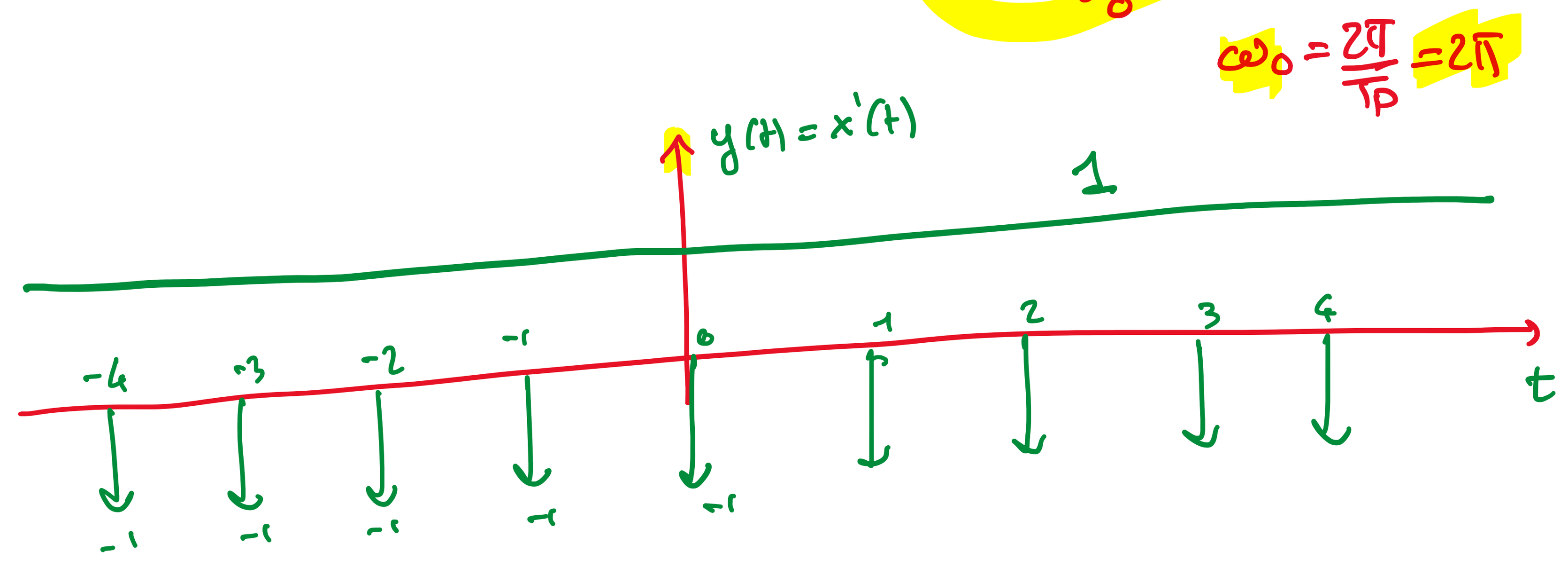


$A_x(T_p) = 1/2 \quad T_p = 1 \quad m_x = 1/2$

$X_K = ?$

$$X_K = \int_0^1 t \cdot e^{-jK\frac{2\pi}{\cancel{\omega_0}}t}\,dt$$

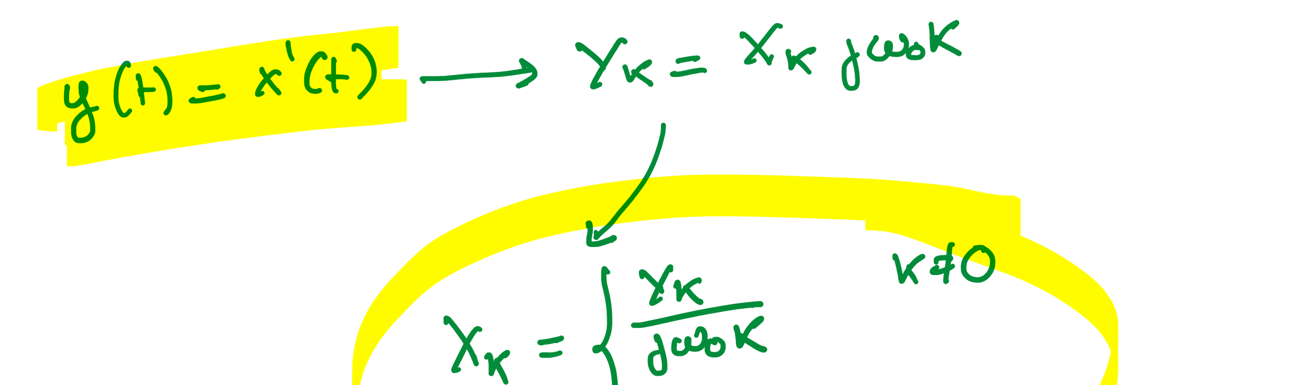
$\omega_0 = \frac{2\pi}{T_p} = 2\pi$



$$y(t) = x'(t) = 1 - \text{rep}_1\delta(t) \qquad T_p = 1$$

$\mathcal{F}\downarrow$

$$Y_K = X_K \cdot jK2\pi = \delta(K) - 1 = \begin{cases} 0 & K=0 \\ -1 & K\neq 0 \end{cases}$$

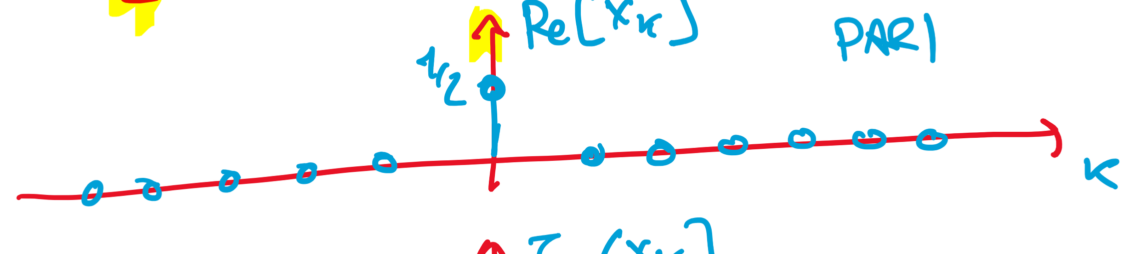


$$X_K = \frac{Y_K}{j\omega_0 K} = \frac{Y_K}{j2\pi K} = \frac{\delta(K)-1}{j2\pi K} \quad K\neq 0$$

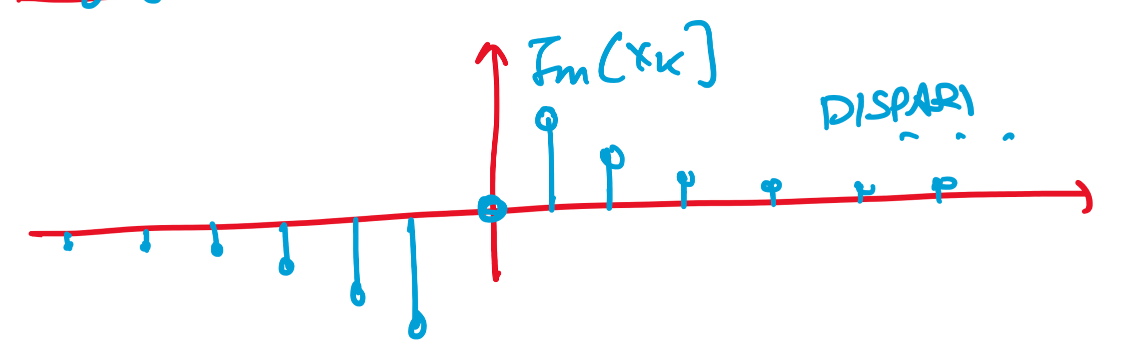
$$y(t) = x'(t) \longrightarrow Y_K = X_K\,j\omega_0 K$$

$$X_K = \begin{cases} \frac{Y_K}{j\omega_0 K} & K\neq 0 \\ m_x & K=0 \end{cases}$$

$$X_K = \begin{cases} \frac{\delta(K)-1}{j2\pi K} = \frac{-1}{j2\pi K} = \frac{j}{2\pi K} & K\neq 0 \\ m_x = \frac{1}{2} & K=0 \end{cases}$$



PARI



DISPARI