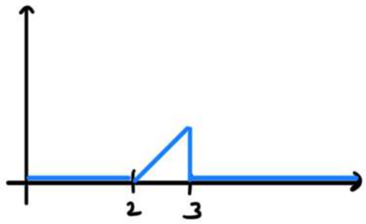
Lezione 4 - 4/03/2024

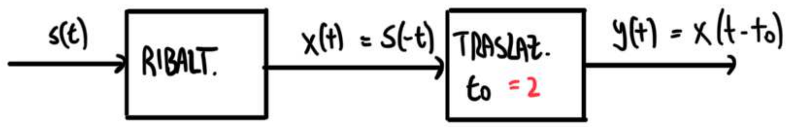
INIZIO: slide 26

ESERCIZIO 5

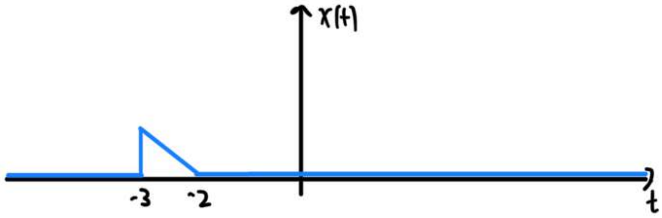
DISEGNARE $y(t) = s(-t+2)$



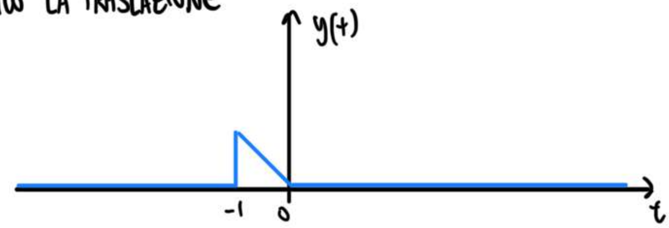
SOL. ipotizziamo di applicare il ribaltamento per primo



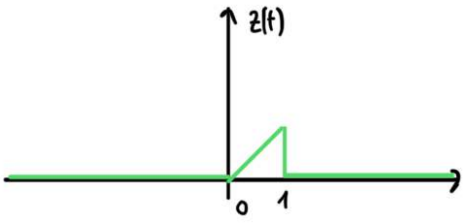
1. APPLICO IL RIBALTAMENTO

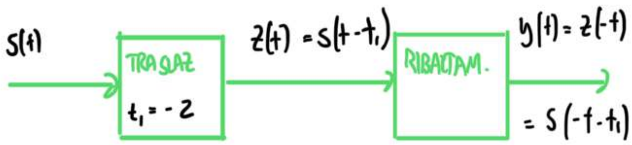


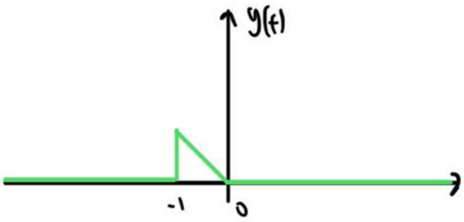
2. APPLICO LA TRASLAZIONE



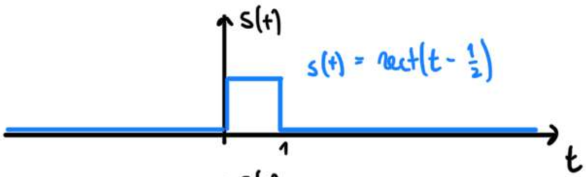
N.B. IN QUESTO CASO POTEVO APPLICARE PRIMA LA TRASLAZIONE E POI IL RIBALTAMENTO:

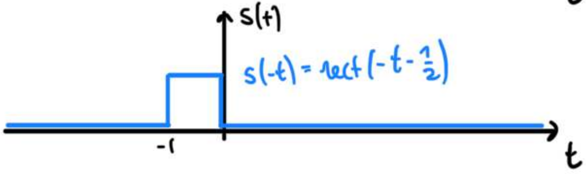






ESERCIZIO: TROVARE PARTE PARI E DISPARI DI

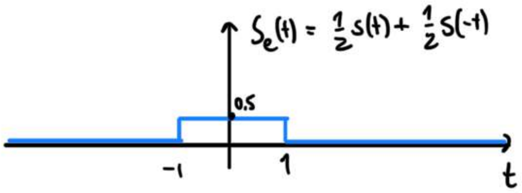




$= rect\left(-t - \frac{1}{2}\right)$

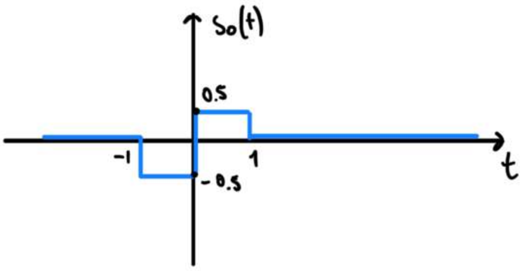
$= rect\left(-\left(t + \frac{1}{2}\right)\right)$

$= rect\left(t + \frac{1}{2}\right)$ PARI



$$S_e(t) = \frac{1}{2} rect\left(t - \frac{1}{2}\right) + \frac{1}{2} rect\left(t + \frac{1}{2}\right)$$

$$= \frac{1}{2} rect\left(\frac{t}{2}\right)$$



$$S_o(t) = \frac{1}{2} sign(t) \cdot rect\left(\frac{t}{2}\right)$$

ESERCIZIO: TROVARE A_s, m_s, E_s, P_s PER $s(t) = e^{(\sigma_0 + j\omega_0)t} \cdot 1(t)$ (con $\sigma_0 < 0$)

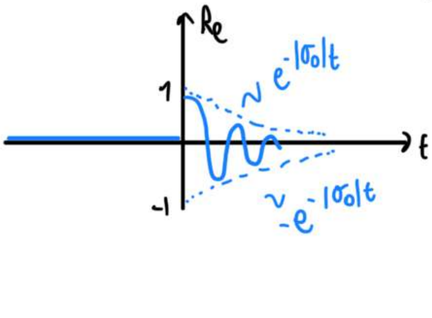
SOL. SPEZZO IL SEGNALE IN UN PRODOTTO

$$s(t) = e^{\sigma_0 t} \cdot e^{j\omega_0 t} \cdot 1(t)$$

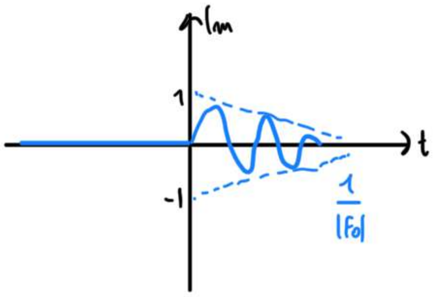
$$= e^{-|\sigma_0| t} \left(\cos(\omega_0 t) + j\sin(\omega_0 t)\right) \cdot 1(t)$$

$$= \underbrace{e^{-|\sigma_0 t|} \cos(\omega_0 t) \cdot 1(t)}_{Re} + j \underbrace{e^{-|\sigma_0| t} \sin(\omega_0 t) \cdot 1(t)}_{Im}$$

disegniamo parte reale e parte immaginaria



$\omega_0 = 2\pi F_0$



1. AREA DEL SEGNALE

$$A_s = \int_{-\infty}^{+\infty} e^{(\sigma_0 + j\omega_0)t} \cdot 1(t)\, dt = \int_{0}^{+\infty} e^{(\sigma_0 + j\omega_0)t}\, dt = \left[\frac{e^{(\sigma_0 + j\omega_0)t}}{\sigma_0 + j\omega_0} \right]_0^{+\infty}$$

PRESENZA DEL GRADINO

$$= \frac{0-1}{\sigma_0 + j\omega_0} = \frac{-1}{\sigma_0 + j\omega_0}$$

2. VALORE MEDIO

$m_s = 0$ (PERCHÉ L'AREA È FINITA)

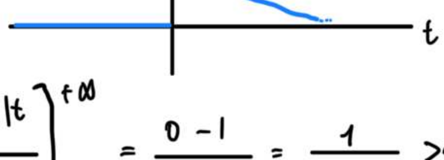
3. ENERGIA

$$|s(t)|^2 = \left| e^{\sigma_0 t} \cdot e^{j\omega_0 t} \cdot 1(t) \right|^2 = \underbrace{\left| e^{\sigma_0 t} \right|^2}_{= e^{2\sigma_0 t}} \cdot \left| e^{j\omega_0 t} \right|^2 \cdot \underbrace{\left| 1(t) \right|^2}_{= 1(t)}$$

MODULO 1

(perché e^{jx} è un numero complesso che sta sulla circonferenza unitaria)

$$= e^{-2|\sigma_0|t} \cdot 1(t)$$



$$E_s = \int_{-\infty}^{+\infty} e^{-2|\sigma_0|t} \cdot 1(t) = \int_{0}^{+\infty} e^{-2|\sigma_0|t}\, dt = \left[\frac{e^{-2|\sigma_0|t}}{-2|\sigma_0|} \right]_0^{+\infty} = \frac{0-1}{-2|\sigma_0|} = \frac{1}{2|\sigma_0|} > 0$$

meno male, perché è un'energia

4. POTENZA

$P_s = 0$ (PERCHÉ L'ENERGIA È FINITA)