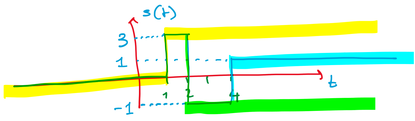
Le07

Monday, 9 March 2026 08:34

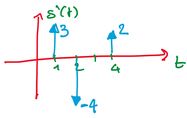
ES 1



$s'(t) = ?$

$s'(t) = 3\,\delta(t-1) + (-4)\,\delta(t-2) + 2\,\delta(t-4)$

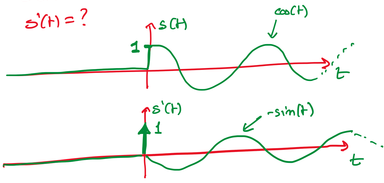
$s(t) = 3\,1(t-1) - 4\,1(t-2) + 2\,1(t-4)$



ES 2

$s(t) = \cos(t)\,1(t)$

$s'(t) = ?$



$s'(t) = \cos'(t)\,1(t) + \cos(t)\,1'(t)$

$= -\sin(t)\,1(t) + \cancel{\cos(t)}\,\delta(t)$

1

ES 3

SIGNIFICATO DI $\delta'(t)$

$$\int_{-\infty}^{+\infty} s(t)\,\delta'(t)\,dt = s(t)\,\delta(t)\Big]_{-\infty}^{+\infty} - \int_{-\infty}^{+\infty} s'(t)\,\delta(t)\,dt$$

($s(t)$ sopra, $\delta'(t)$ sotto)

$$= 0 - s'(0)$$

$$= -s'(0)$$

ES 4

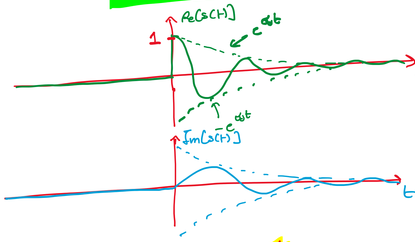
TROVARE A_s, m_s, E_s, P_s PER $s(t) = e^{(\sigma_0 + j\omega_0)t}\,1(t)$

$\sigma_0 < 0$, ω_0 REALE

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

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

$$= e^{\sigma_0 t}\cos(\omega_0 t)\,1(t) + j\,e^{\sigma_0 t}\sin(\omega_0 t)\,1(t)$$



$$s(t) = e^{(\sigma_0 + j\omega_0)t}\,1(t) = e^{s_0 t}\,1(t) \qquad s_0 = \sigma_0 + j\omega_0$$

$$A_s = \int_{\cancel{-\infty}\,0}^{+\infty} e^{s_0 t}\,\cancel{1(t)}\,dt = \frac{e^{s_0 t}}{s_0}\Big]_0^{+\infty}$$

$$= \frac{0 - 1}{s_0} = \frac{-1}{\sigma_0 + j\omega_0} \cdot \frac{\sigma_0 - j\omega_0}{\sigma_0 - j\omega_0}$

(s_0 sotto il primo fattore, s_0^* sotto il secondo)

$$= \frac{-\sigma_0 + j\omega_0}{\sigma_0^2 + \omega_0^2}$$

$$= \frac{-\sigma_0}{\sigma_0^2 + \omega_0^2} + j\,\frac{\omega_0}{\sigma_0^2 + \omega_0^2}$$

NOTA: $(a+b)(a-b) = a^2 - b^2$

$a = \sigma_0$, $b = j\omega_0$

$= \sigma_0^2 - (-1)\omega_0^2 = \sigma_0^2 + \omega_0^2$

$m_s = 0$

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

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

1

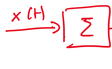
$$= e^{2\sigma_0 t} \cdot \cancel{1} \cdot 1(t)$$

$$E_s = \int_{\cancel{-\infty}\,0}^{+\infty} e^{-2|\sigma_0|t}\,\cancel{1(t)}\,dt = \frac{e^{-2|\sigma_0|t}}{-2|\sigma_0|}\Big]_0^{+\infty}$$

$$= \frac{+1}{+2|\sigma_0|} > 0$$

$P_s = 0$

NOTA



$x_1(t) \xrightarrow{\Sigma} y_1(t) = x_1(t) + \cos(t)$

$x_2(t) \xrightarrow{\Sigma} y_2(t) = x_2(t) + \cos(t)$

NON LINEARE

$x_1(t) + x_2(t) \xrightarrow{\Sigma}{?} y_1(t) + y_2(t)$

$x_1(t) + x_2(t) \xrightarrow{\Sigma} x_1(t) + x_2(t) + \cos(t)$

$\overset{?}{=} y_1(t) + y_2(t)$

$\overset{?}{=} x_1(t) + \cos(t) + x_2(t) + \cos(t)$