Le10

Thursday, 21 March 2024 08:56

Es1

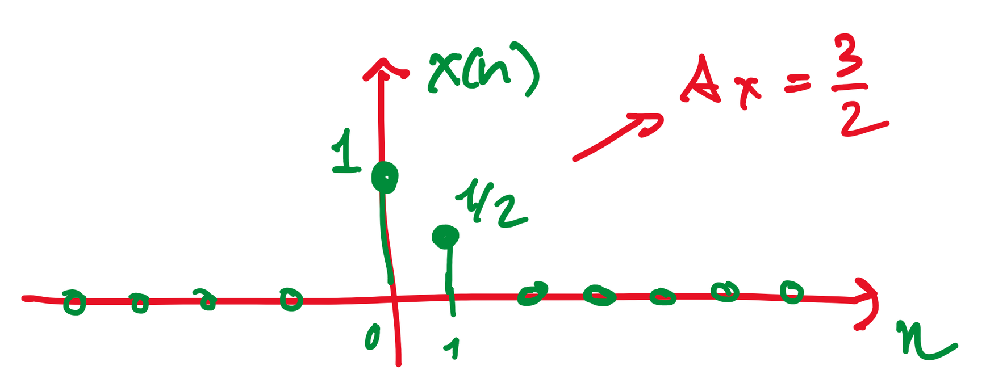
$$x(n) = \delta(n) + \frac{1}{2}\delta(n-1)$$

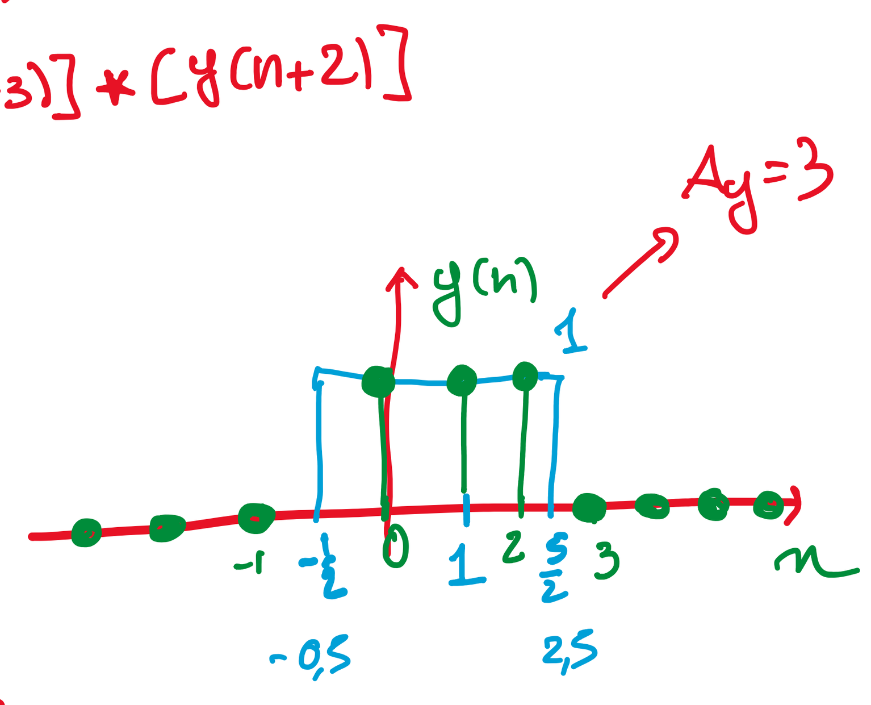
$$y(n) = rect\left(\frac{n-1}{3}\right) = rect\left(\frac{t-1}{3}\right)\Big|_{t=n}$$

A) DISEGNARE $x(n)$ E $y(n)$

B) CALCOLARE $z(n) = x * y(n)$

C) CALCOLARE $v(n) = [x(n-3)] * [y(n+2)]$





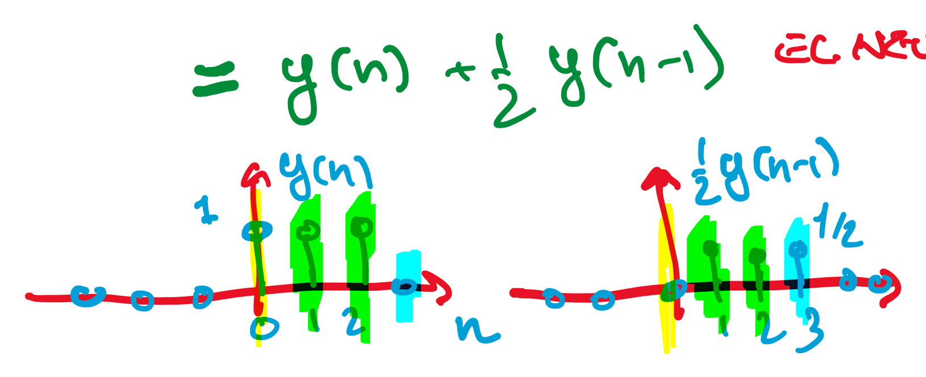
$$z(n) = x * y(n) = \sum_{k=-\infty}^{+\infty} x(k)\, y(n-k)$$

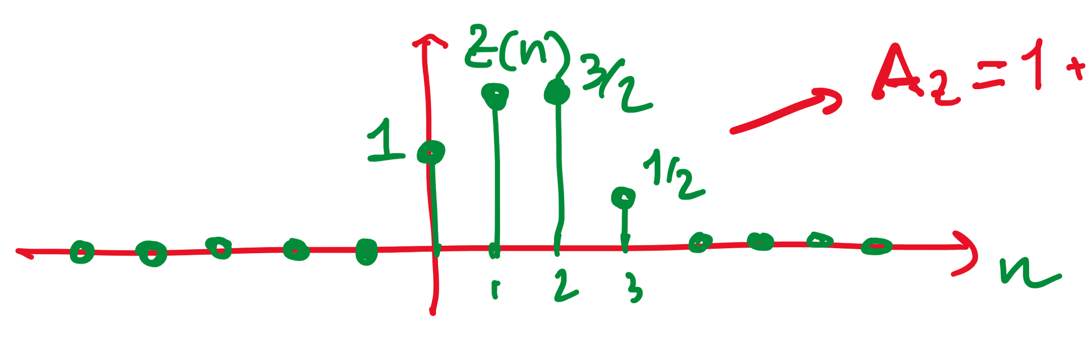
$$= \left[\delta(n) + \frac{1}{2}\delta(n-1)\right] * y(n)$$

$$= \delta * y(n) + \frac{1}{2}[\delta(n-1)] * y(n)$$ LINEARITÀ

$$= \delta * y(n) + \frac{1}{2}\delta * y(n-1)$$ PROPR. TRASLAZIONE

$$= y(n) + \frac{1}{2}y(n-1)$$ EL. NEUTRO CONV.





$$A_z = 1 + \frac{3}{2}\cdot 2 + \frac{1}{2} = \frac{9}{2}$$ ✓

$$A_x \cdot A_y = \frac{3}{2}\cdot 3$$

$e_z = [0, 3]$

$e_x = [0, 1]$ ✓

$e_y = [0, 2]$

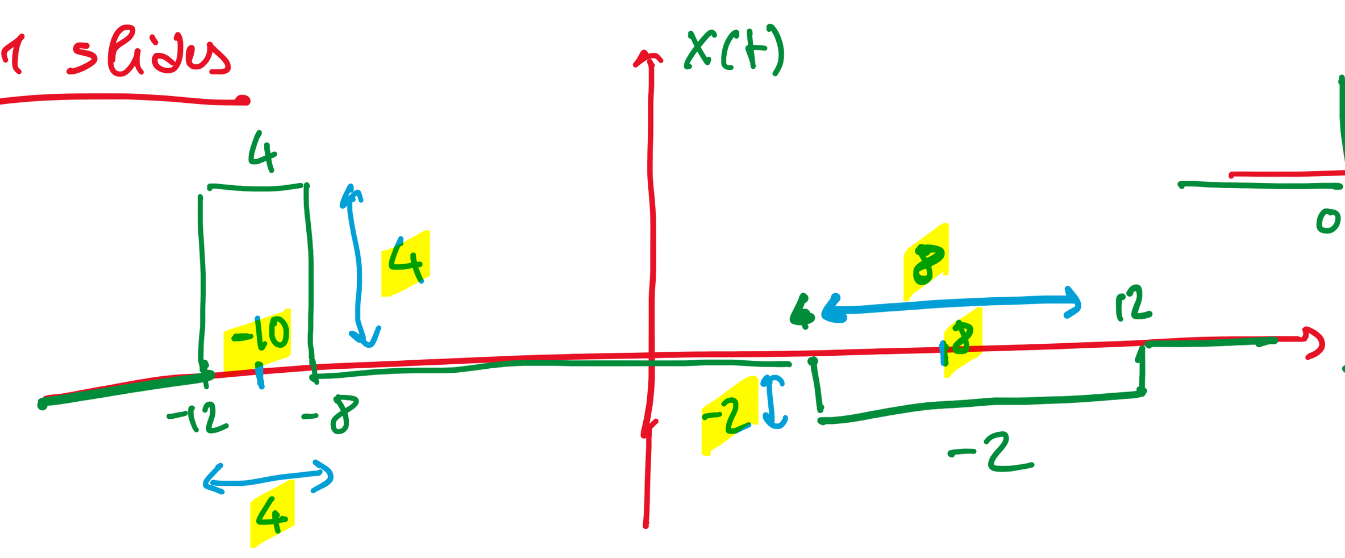
$$v(n) = [x(n-3)] * [y(n+2)]$$

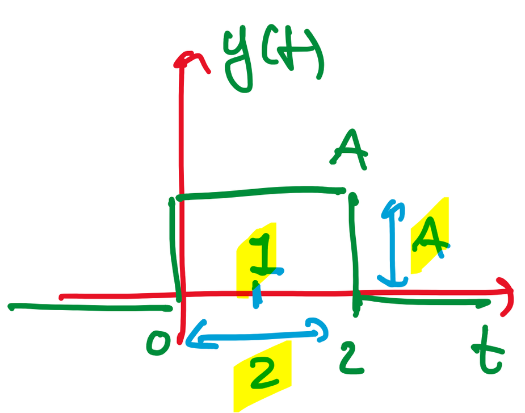
$$= x * y(n-3+2)$$ REGOLA TRASLAZIONE

$$= x * y(n-1)$$

$$= z(n-1)$$

Es 1 slides





CALCOLARE E DISEGNARE $z(t) = x * y(t)$

$$rect\left(\frac{t}{B}\right) = \Pi_B(t)$$

$$x(t) = 4\cdot \Pi_4(t+10) - 2\cdot \Pi_8(t-8)$$

$$y(t) = A\cdot \Pi_2(t-1)$$

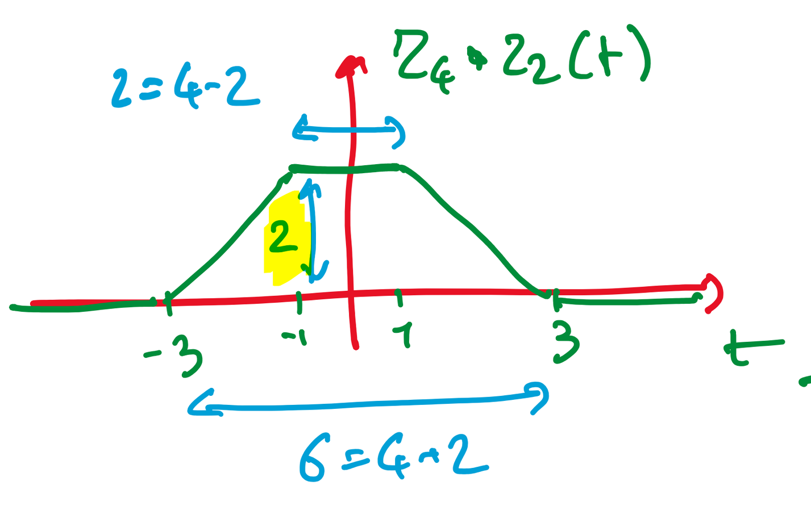
$$z(t) = x * y(t) = [4\cdot \Pi_4(t+10) - 2\,\Pi_8(t-8)] * [A\,\Pi_2(t-1)]$$ LINEARITÀ

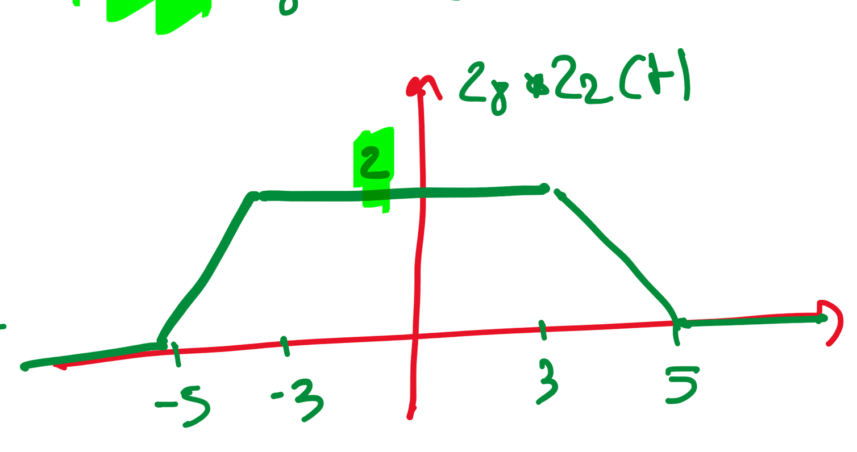
$$= 4\cdot [\Pi_4(t+10)] * [A\,\Pi_2(t-1)]$$

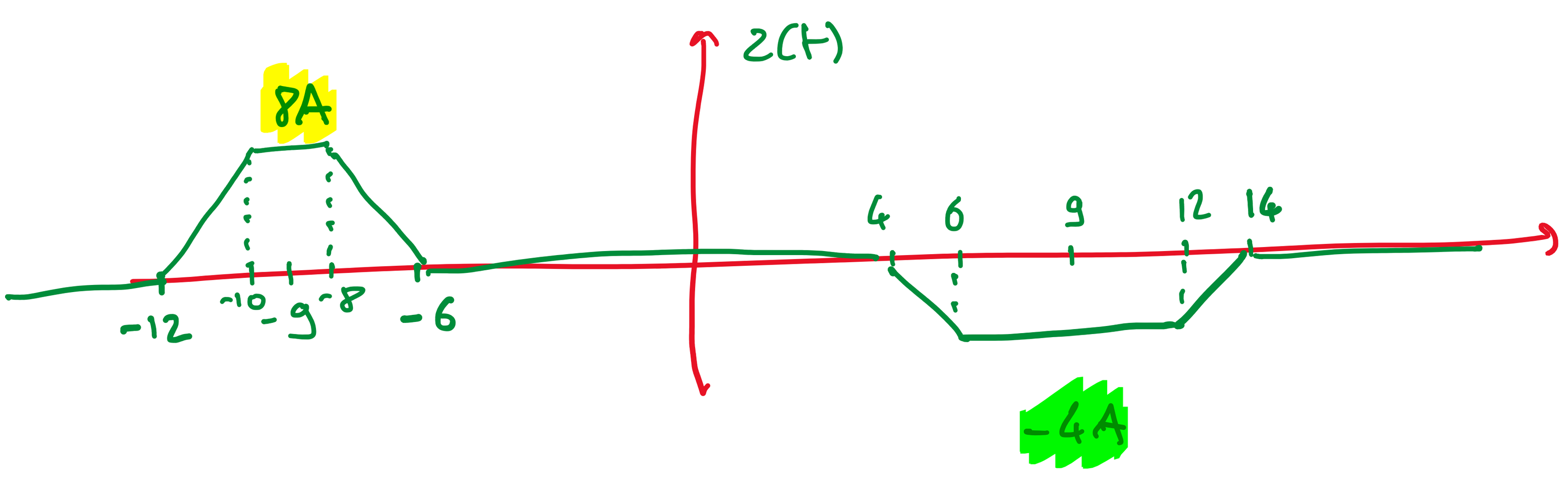
$$- 2[\Pi_8(t-8)] * [A\,\Pi_2(t-1)]$$

$$= 4A\; \Pi_4 * \Pi_2(t+10-1) \quad (9)$$ REGOLA DI TRASLAZIONE

$$-2A\; \Pi_8 * \Pi_2(t-8-1) \quad (-9)$$







Es 3 slides

A)

$$z(t) = \int_{-\infty}^{+\infty} e^{-|u|}\sin(t-u)\,du$$

$$\stackrel{?}{=} \int_{-\infty}^{+\infty} x(u)\, y(t-u)\,du$$

$x(t) = e^{-|t|}$

$y(t) = \sin(t)$

B)

$$z(t) = \int_{-\infty}^{+\infty} e^{t-u}\, 1(u)\, \sin(u+2)\,du$$

$$\stackrel{?}{=} \int_{-\infty}^{+\infty} x(u)\, y(t-u)\,du$$

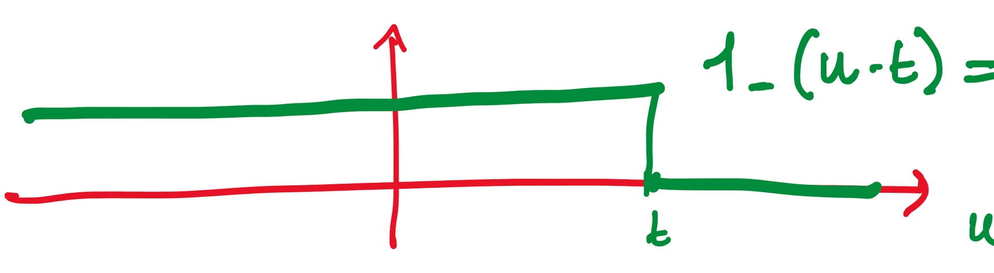
$x(t) = 1(t)\sin(t+2)$

$y(t) = e^{t}$

C)

$$z(t) = \int_{-\infty}^{+\infty} e^{u}\, 1(t-u)\, \sin(t-u+2)\,du$$

$$\stackrel{?}{=} \int_{-\infty}^{+\infty} x(u)\, y(t-u)\,du$$



$1_-(u-t) = 1(t-u)$ → $t-u>0$ ovvero $u<t$

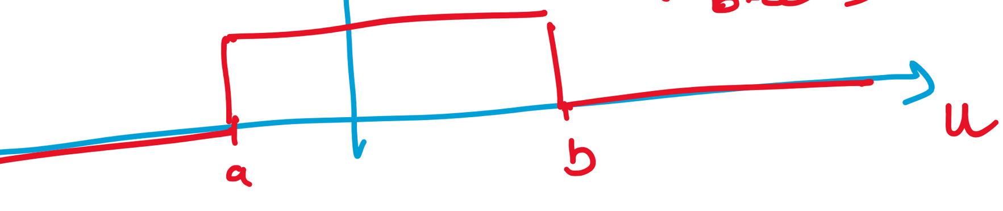
$x(t) = e^{t}$

$y(t) = 1(t)\sin(t+2)$

NOTA

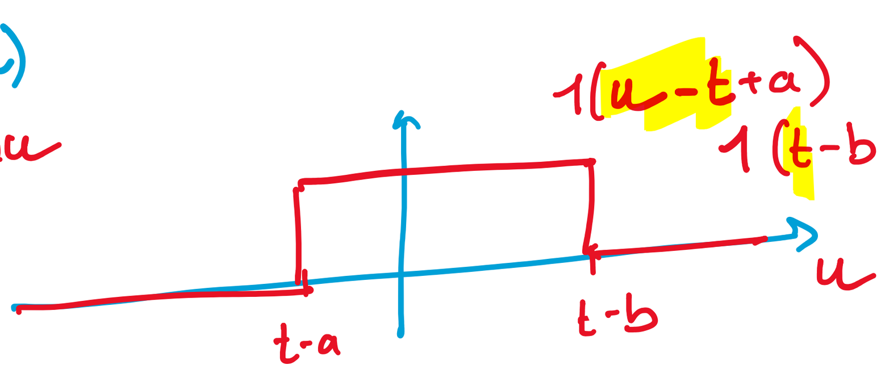
$$\int_{-\infty}^{+\infty} f(u)\,du$$

$$rect\left(\frac{u-\frac{a+b}{2}}{b-a}\right) = 1(u-a)\,1(b-u) = f(u)$$



$$\int_{-\infty}^{+\infty} f(t-u)\,du$$

$1(u-t+a)\; 1(t-b-u) = f(t-u)$



ESTREMO = COSTANTE / t − COSTANTE

D)

$$z(t) = \begin{cases} 0 & t<0 \\ \int_{-\infty}^{+\infty} e^{t-u}\, 1(t-u)\, \sin(u+2)\, 1(u)\,du & t>0 \end{cases}$$

$x(t) = 1(t)\sin(t+2)$

$y(t) = e^{t}\,1(t)$