

RICONOSCERE SE LE SEGUENTI ESPRESSIONI SONO CONVOLUTIONI

ES1

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

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

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

ES2

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

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

$x(t) = \sin(t+2) 1(t)$   
 $y(t) = e^t$

ES3

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

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

$1_{-(u-t)} = 1(- (u-t)) = 1(t-u)$   
 $x(t) = e^t$   
 $y(t) = \sin(t+2) 1(t)$

NOTA

$$\int_a^b \dots du$$

$$\int_{t+a}^{t+b} \dots du$$

ES4

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

$= x * y(t)$  con  $x(t) = \sin(t+2) 1(t)$   
 $y(t) = e^t 1(t)$

$$z(t) = \begin{cases} 0 & t \leq 0 \\ x * y(t) & t > 0 \end{cases} = \cancel{1(t)} \cdot x * y(t)$$

$\mathcal{E}(x+y) = [0, +\infty)$   
**CAUSALE**

ES5

$$z(n) = \sum_{k=-\infty}^{n-1} 3^k 1_0(n-k-1)$$

$$\stackrel{\text{SÌ}}{=} \sum_{k=-\infty}^{+\infty} x(k) y(n-k)$$

$1_0-(k-(n-1)) = 1_0(n-1-k)$

$x(n) = 3^n$   
 $y(n) = 1_0(n-1)$