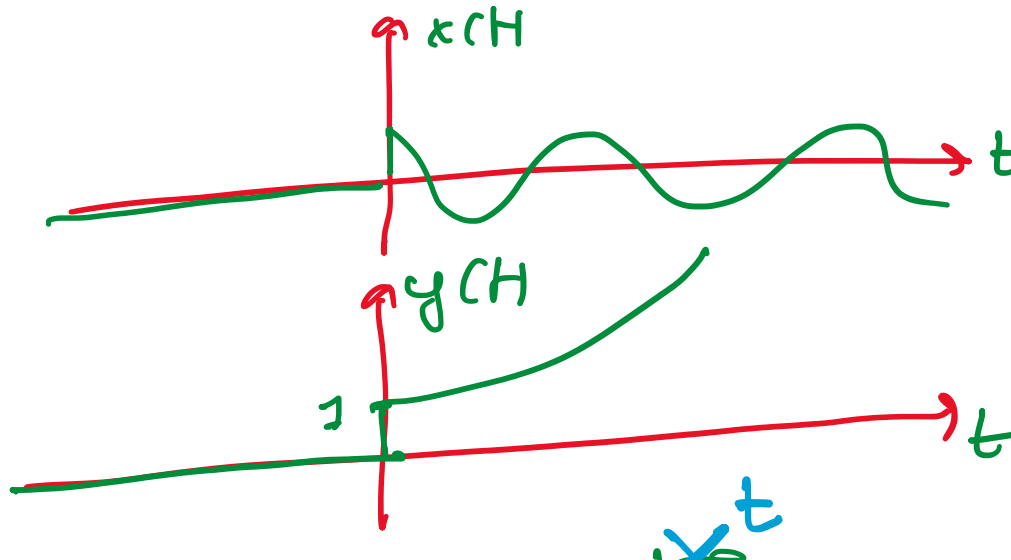


NOTA

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

$y(t) = e^t 1(t)$



$E_x = [0, \infty)$

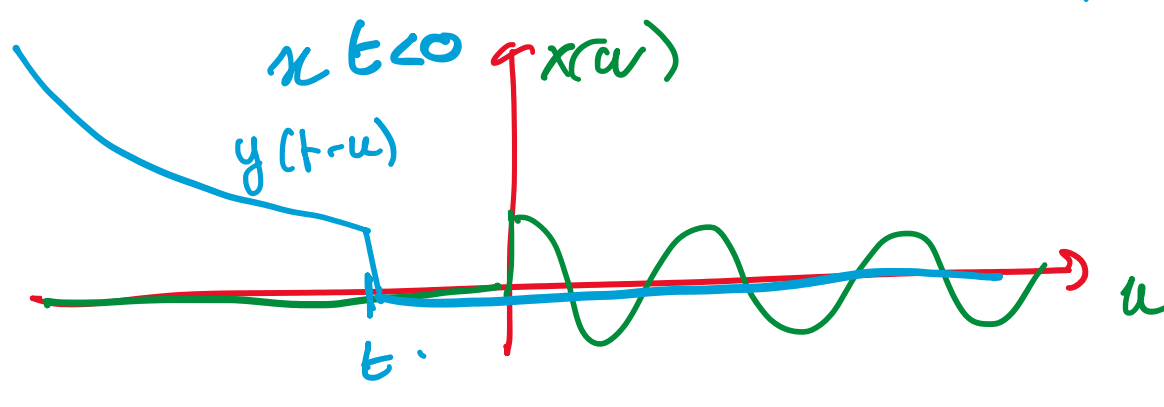
$E_y = [0, \infty)$

$z = x * y$

$E_z = [0, \infty)$

$$z(t) = \int_0^t \sin(u+2) \cdot e^{t-u} du$$

*Annotations: 'nasensibile per t > 0' with an arrow pointing to the integral limits; 't > u' and 'u < t' with arrows pointing to the integration variable u.*

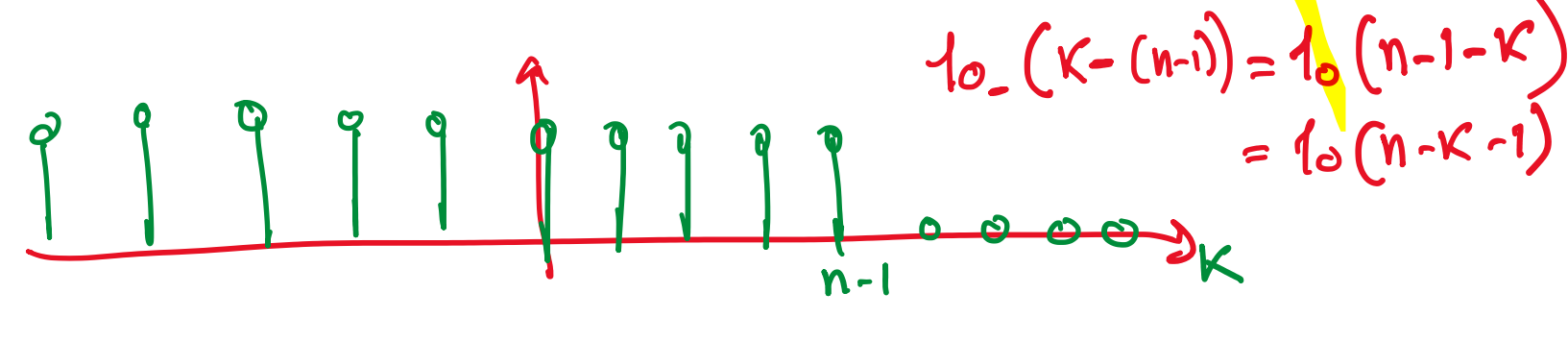


$y(t-u)x(u) = 0$

Es 5 slides

$$z(n) = \sum_{k=-\infty}^{n-1} 3^k = \sum_{k=-\infty}^{n-1} 10(n-k-1) 3^k$$

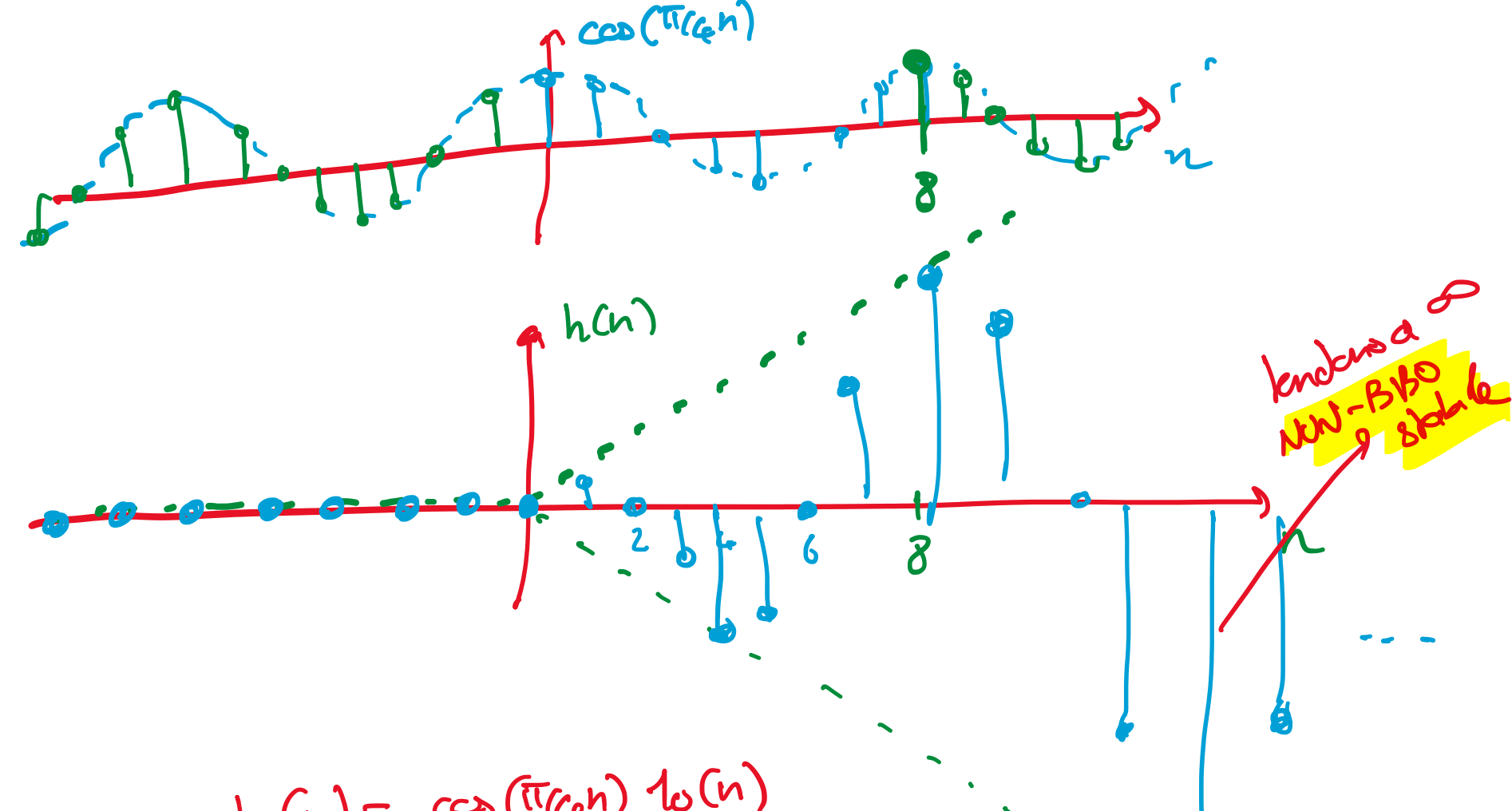
$$= \sum_{k=-\infty}^{n-1} x(k) y(n-k)$$



$x(n) = 3^n$   
 $y(n) = 10(n-1)$

Es 1.4 slides

BIBO STABILITA' DI  $h(n) = n \cos(\pi/4 n) 10(n)$

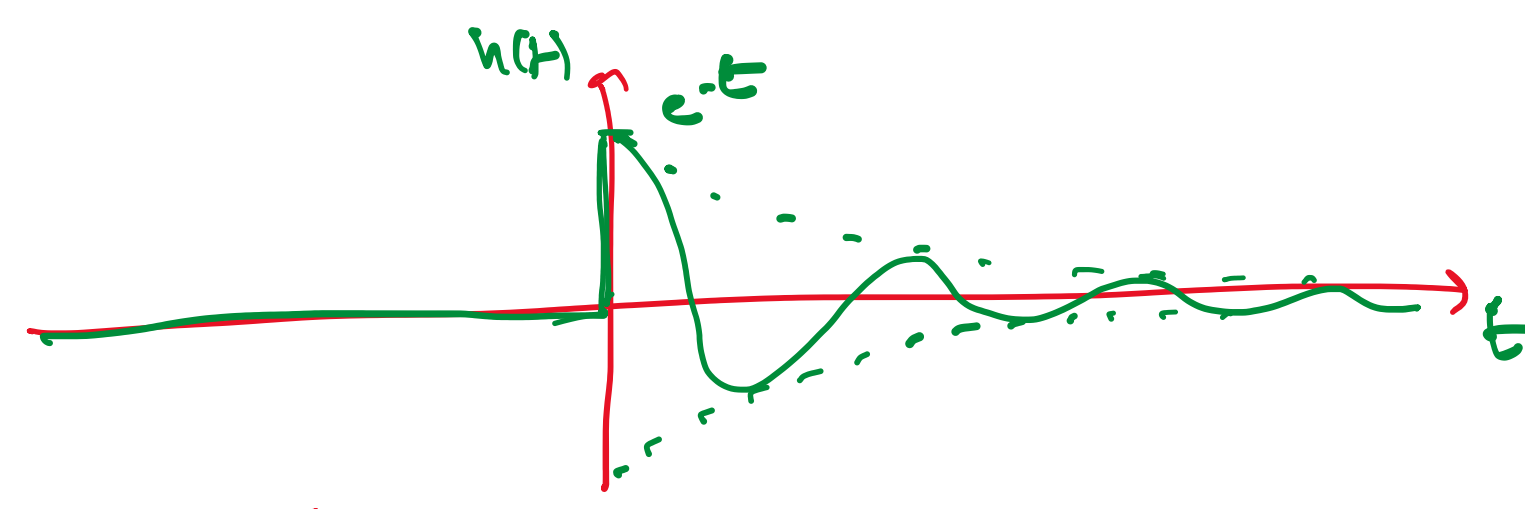


$e \approx h(n) = \cos(\pi/4 n) 10(n)$

$\sum_{n=0}^{\infty} |h(n)| = \infty$   
**NON BIBO STABILE**

Es 1.6 slides

STABILITA' BIBO CON  $h(t) = e^{-t} \cos(2t) 1(t)$



REALE CAUSALE

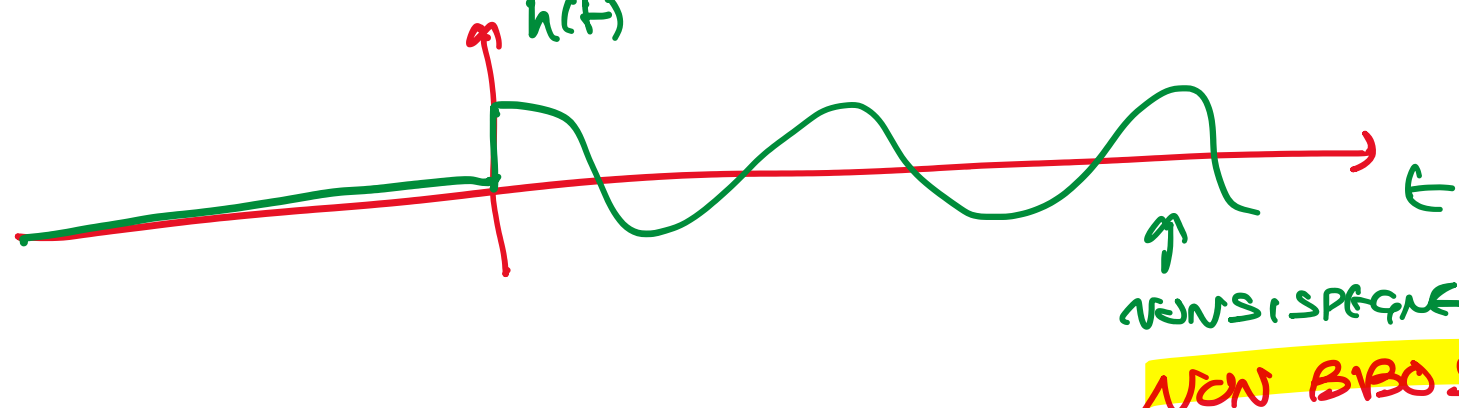
$$L_n = \int_{-\infty}^{\infty} |e^{-t} \cos(2t)| |1(t)| dt$$

$$= \int_0^{\infty} e^{-t} |\cos(2t)| dt$$

$$\leq \int_0^{\infty} e^{-t} dt = -e^{-t} \Big|_0^{\infty} = 0 - (-1) = 1$$

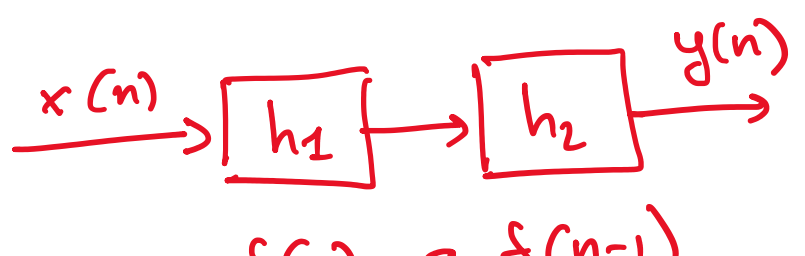
**BIBO STABILE**

$e \approx h(t) = \cos(2t) 1(t)$  ?



**NON BIBO STABILE**

Es 2 slides



$x(n) = \delta(n) - a \delta(n-1)$

$h_1(n) = \sin(\delta n)$  → NON BIBO ST.

$h_2(n) = a^n 10(n)$  |a| < 1 → BIBO ST.

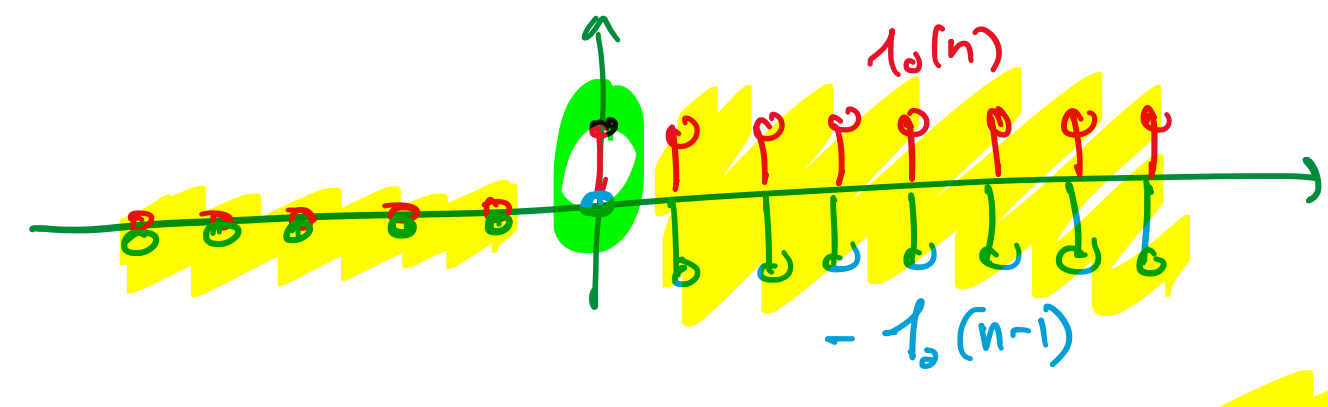
$h(n) = h_1 * h_2(n)$

1) BIBO STABILE ? **NON BIBO ST.**

2) USCITA y(n) = ?

$$y(n) = x * h_1 * h_2(n)$$
  
$$= (x * h_2) * h_1(n)$$

$$z(n) = x * h_2(n) = h_2(n) - a h_2(n-1)$$
  
$$= a^n 10(n) - a \underbrace{a^{n-1} 10(n-1)}_{a^n}$$
  
$$= a^n (10(n) - 10(n-1)) = a^n \delta(n)$$
  
$$= \delta(n)$$



$$y(n) = \delta * h_1(n) = h_1(n) = \sin(\delta n)$$