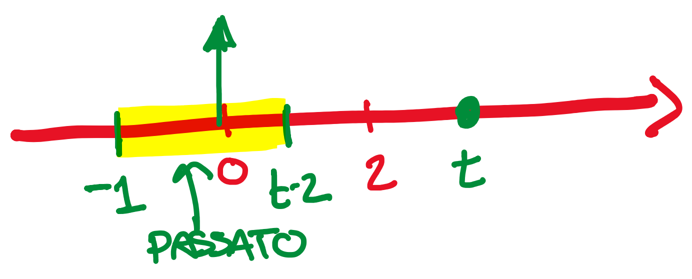
Le08

Thursday, 12 March 2026 08:34

ES1

$$y(t)=\begin{cases}0 & t\le 2\\ \cos(t-2)\int_{-1}^{t-2} x(u)\,du & t>2\end{cases}$$

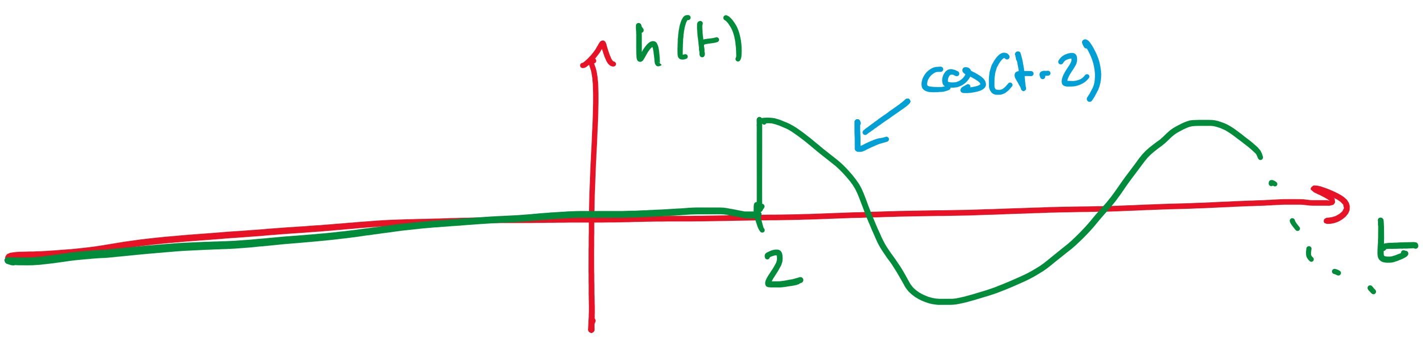
1) CAUSALE SI'
2) LINEARE SI'
3) BIBO STABILE ← NO
4) RISPOSTA IMPULSIVA $h(t)$ ✓
5) RISPOSTA AL GRADINO $h_{-1}(t)$ ✓
6) TEMPO-INVARIANTE NO



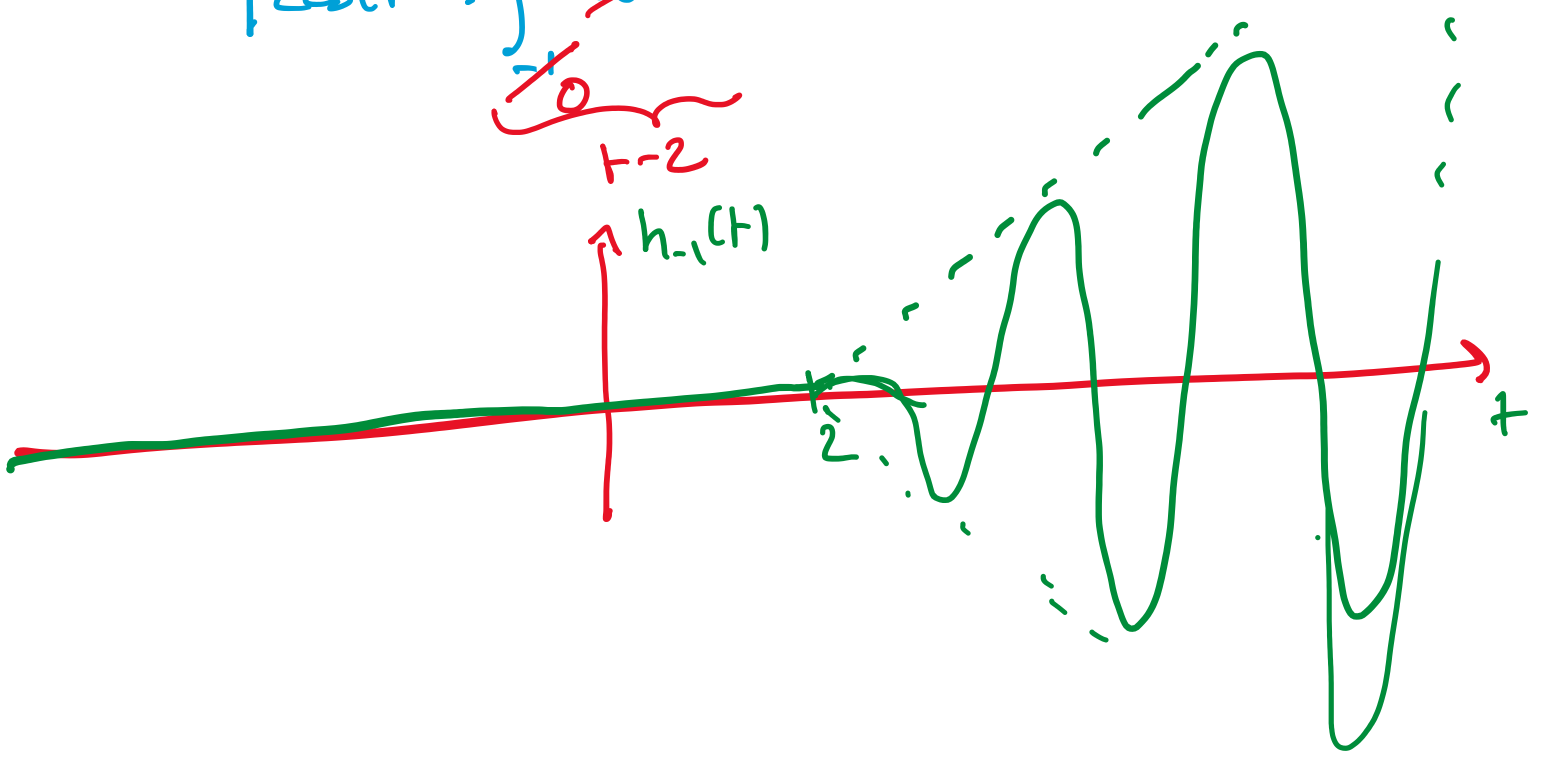
2)
$$\Sigma[a x_1(t)+b x_2(t)]=\begin{cases}0 & t\le 2\\ \cos(t-2)\underbrace{\int_{-1}^{t-2} a x_1(u)+b x_2(u)\,du}_{\cos(t-2)\,a\int_{-1}^{t-2} x_1(u)\,du+\cos(t-2)\,b\int_{-1}^{t-2} x_2(u)\,du} & t>2\end{cases}$$

$$= a\,y_1(t)+b\,y_2(t)$$

4)
$$h(t)=\begin{cases}0 & t\le 2\\ \cos(t-2)\underset{1}{\cancel{\int_{-1}^{t-2}\delta(u)\,du}} & t>2\end{cases}=\cos(t-2)\,1(t-2)$$



5)
$$h_{-1}(t)=\begin{cases}0 & t\le 2\\ \cos(t-2)\underbrace{\int_{\cancel{-1}\,0}^{t-2}\overset{1}{\cancel{1(u)}}\,du}_{t-2} & t>2\end{cases}=(t-2)\cos(t-2)\,1(t-2)$$



6)
$$y(t-t_0)=\begin{cases}0 & t-t_0\le 2\\ \cos(t-t_0-2)\int_{-1}^{t-t_0-2} x(u)\,du & t-t_0>2\end{cases}$$

$$\Sigma[x(t-t_0)]=\begin{cases}0 & t\le 2\\ \cos(t-2)\underbrace{\int_{-1}^{t-2} x(u-t_0)\,du}_{\int_{-1-t_0}^{t-2-t_0} x(v)\,dv} & t>2\end{cases}$$

$v=u-t_0$

ES2

$$y(n)=\begin{cases}\operatorname{sign}(1/x(n)) & x(n)\neq 0\\ 0 & x(n)=0\end{cases}=\Sigma[x(n)]$$

$$=f(x(n))$$

TRASF. ISTANTANEA

1) CAUSALE SI'
2) TEMPO INVARIANTE SI' $y(n-n_0)\overset{\cancel{?}}{=}\Sigma[x(n-n_0)]$
   $\downarrow$ $f(x(n-n_0))$ $\downarrow$ $f(x(n-n_0))$
3) BIBO STABILE SI' xCHE' $y(n)\in\{0,1,-1\}$
4) RISP. IMPULSIVA $\delta(n)$
5) LINEARE
   SICURAMENTE NO xCHE' $y(n)\in\{0,1,-1\}$

SE
$$y(n)=\begin{cases}n\operatorname{sign}(1/x(n)) & x(n)\neq 0\\ 0 & x(n)=0\end{cases}$$

$$=f(x(n),n)$$

NO TEMPO INVARIANTE!

$$y(n-n_0)=f(x(n-n_0),n-n_0)$$

$$\Sigma[x(n-n_0)]=f(x(n-n_0),n)$$

$$g(n)=\begin{cases}\operatorname{sign}(1/\underset{1}{\cancel{\delta(n)}})=1 & \cancel{\delta(n)\neq 0}\ n=0\\ 0 & \cancel{\delta(n)=0}\ n\neq 0\end{cases}=\delta(n)$$