Properties of LTI systems

Memoryless	$h(t) = K\,\delta(t)$	$h[n] = K\,\delta[n]$
Inv	$h_1(t) \circledast h_2(t) = \delta(t)$	$h_1[n] \circledast h_2[n] = \delta[n]$
Causal	$h(t) = 0 \quad t < 0$	$h[n] = 0 \quad n < 0$
Stable	$\int_{-\infty}^{\infty} \lvert h(t) \rvert\, dt < \infty$	$\sum_{n=-\infty}^{\infty} \lvert h(n) \rvert < \infty$

$y(t) = x(t - t_0)$ ⟶ LTI

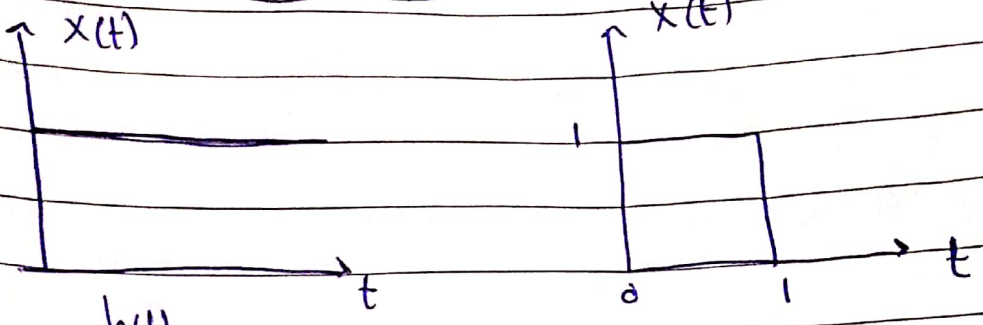
Check stability using LTI Properties

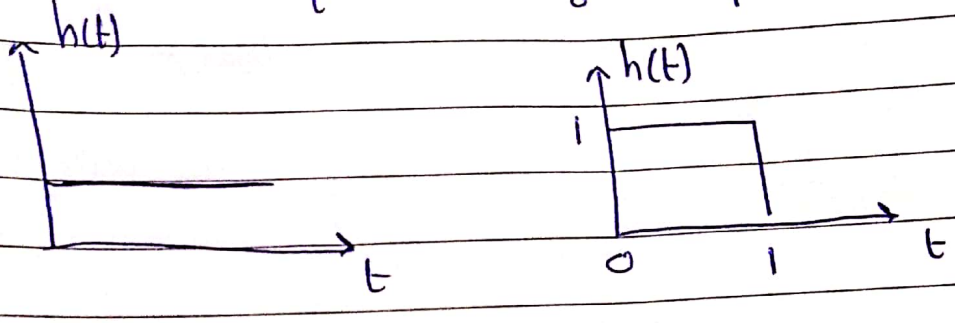
$$\int_{-\infty}^{\infty} \lvert h(t) \rvert\, dt < \infty$$

$h(t) = \delta(t - t_0)$ $\quad \delta(t) \rightarrow$ [ ] $\rightarrow h(t)$

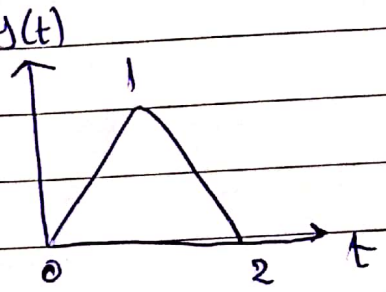
- $\int_{-\infty}^{\infty} \delta(t - t_0)\, dt = 1 < \infty$
- $\int_{-\infty}^{t} \delta(\tau)\, d\tau = u(t) \qquad \int_{-\infty}^{\infty} \lvert u(t) \rvert\, dt \rightarrow \infty$

Convolution with MATLAB






```
t =
x =
h =
y = conv(x,h)
plot(t,y)
ty =
```



length x	# x 3
t - h	# h 2
	-1 -1
C	D