* Let us revisit the CT FS.

Property ⑧ for CT FS.

$x(t) \longleftrightarrow a_k, \omega_0$.

$y(t) = x(t) * h(t)$ is the output when passing $x(t)$ through a LTI system $h(t)$

$y(t) \longleftrightarrow$.

pf:

* This is the big picture of learning F.S

There are two ways of computing the FS of y_k.

Route 1

$x(t) \xrightarrow{h(t)} y(t) = h(t) * x(t)$

$\downarrow$ by ① inspection / direct computation ② properties.

(b_k, ω_0)

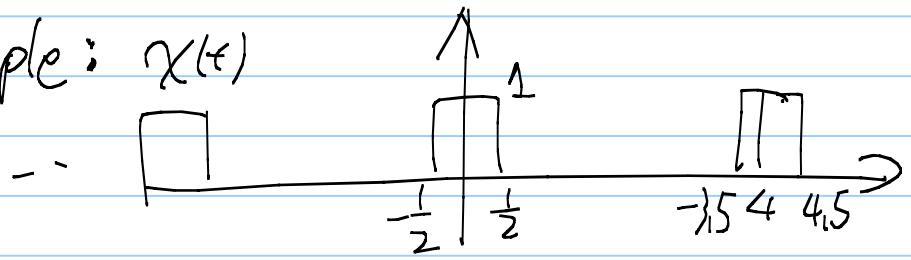
Route 2

$x(t)$

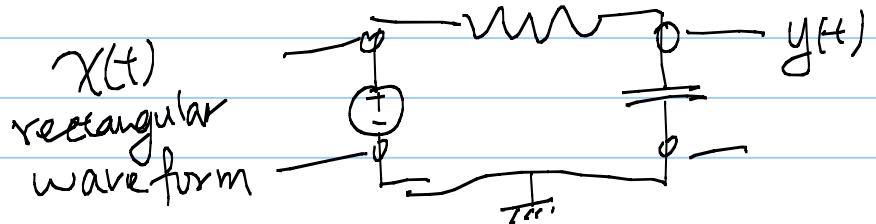
$\downarrow$ F.S.

$(a_k, \omega_0) \xrightarrow{H(j\omega)} a_k = b_k H(jk\omega_0)$, ω_0

Example: $x(t)$



$x(t) \rightarrow \boxed{h(t) = e^{-t}u(t)} \rightarrow y(t)$



Q: Find the F.S of $y(t)$

Ans: Step 1: Find the F.S of $x(t)$ first

Step 2: Compute $H(jw)$ & $H(jk\omega_0)$

Step 3:

Similarly for DTFS.

* Pay attention to the upper/lower limits of the summation

Q: In practice, how to decide the freq characteristics of an unknown LTI sys?

Ans: Step1: Record $h(t)$ by sending $\delta(t)$ as input

Step 2: Compute $H(j\omega) = \int_{s=-\infty}^{\infty} h(s) e^{-j\omega s} ds$

Step 3: Evaluate $|H(j\omega)|^2$ as a function of ω.