Convolutional sum/
Convolutional integral

$y[n] =$, $y(t)$

mathematically.

They are just a
sum & an integral

Intuitively.

Compute the output
$y(t)$ from the input
$x(t)$ & the impulse
response $h(t)$

* Properties of convolution / LTI systems
(All properties apply both to the convolutional
sums (DT) & convolutional integral.)
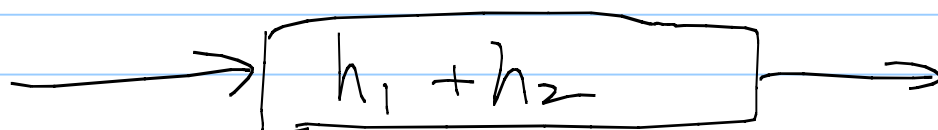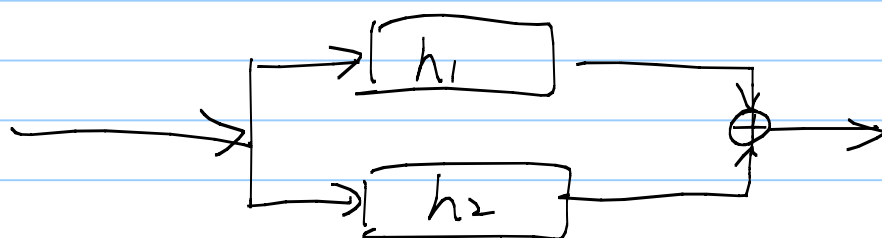
We use $x*h$ as short hand.

① Commutativity

pf:

② Distributility

pf 1:

pf 2:

Q: Are the two systems identical

Ans: Since the impulse response is the "__essence__" of the system, we only need to check whether their impulse responses are identical

$$\longrightarrow \boxed{h_1 + h_2} \longrightarrow$$

③ Associativity (serial concatenation)

Question for the teams

pf 1: by integration

pf 2: by system construction.

in a similar way of proving distributivity.

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* The essence of an LTI system:

its impulse response $h(t)$ or $h[n]$

* We have learned

Given a system $\longrightarrow$ decide its
classification

We will now learn