SIGNALS & SYSTEMS

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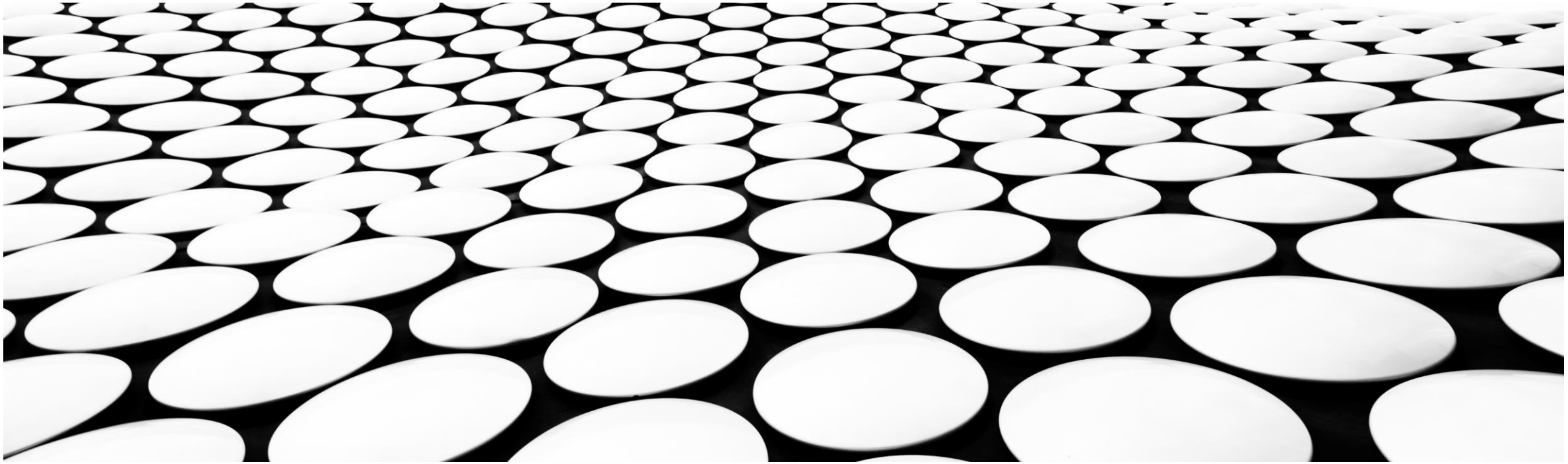
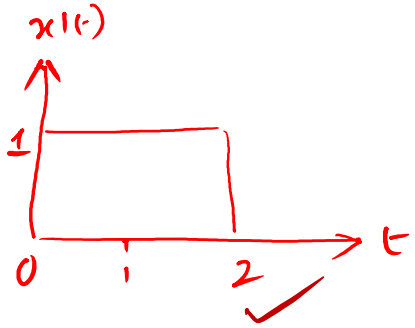
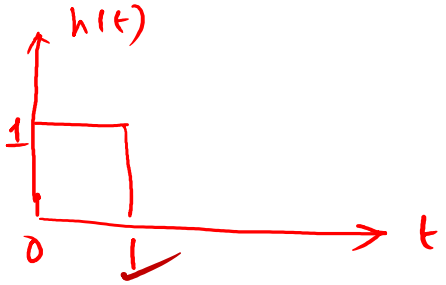


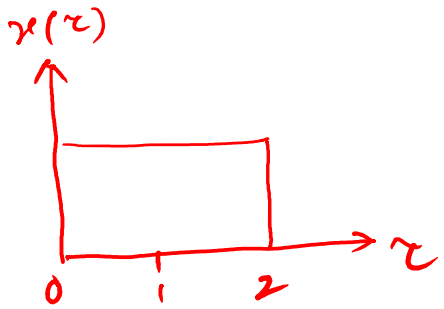
Graphical Convolution



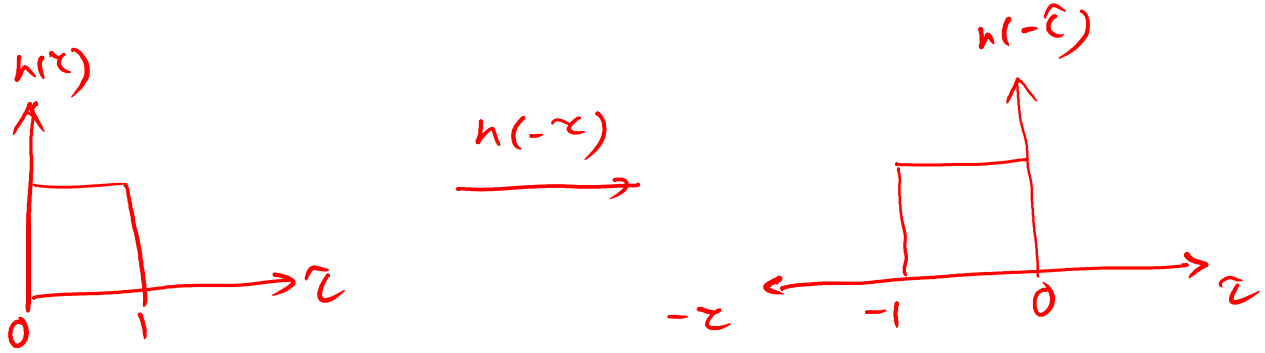


Both Rectangular pulse

Sol^{n}:- Step 1



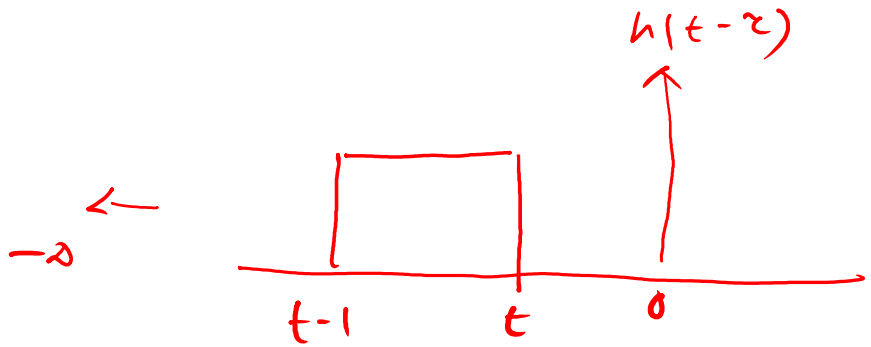
Step 2 :- Time Reversal of $h(\tau)$

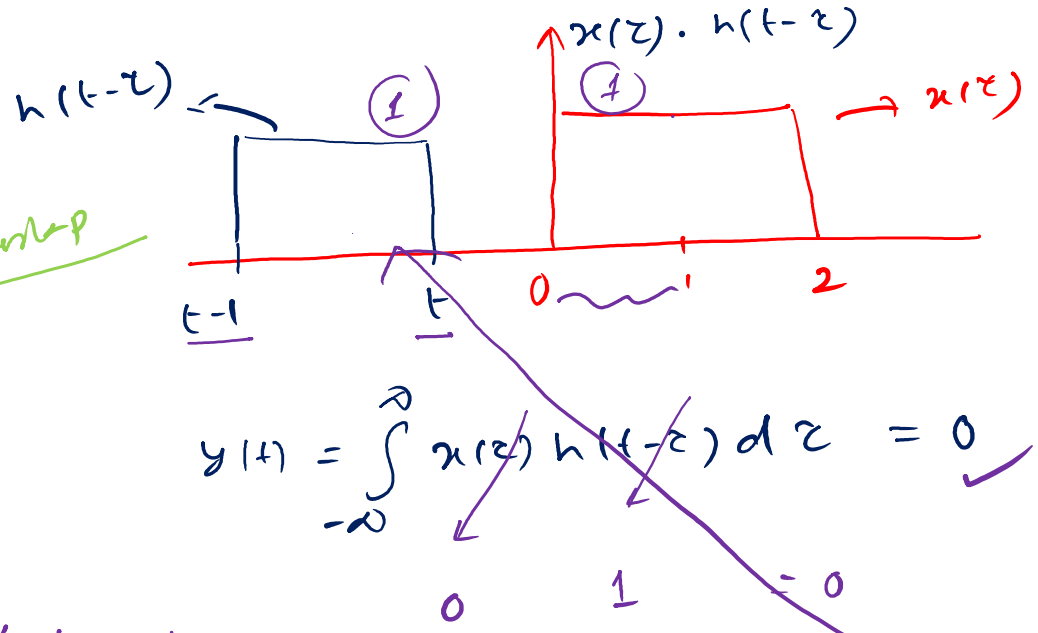


$$y(t) = \int_{-\infty}^{\infty} x(\tau)\, h(t-\tau)\, d\tau$$

Step 3: Time shifting of $h(-\tau)$

Left half

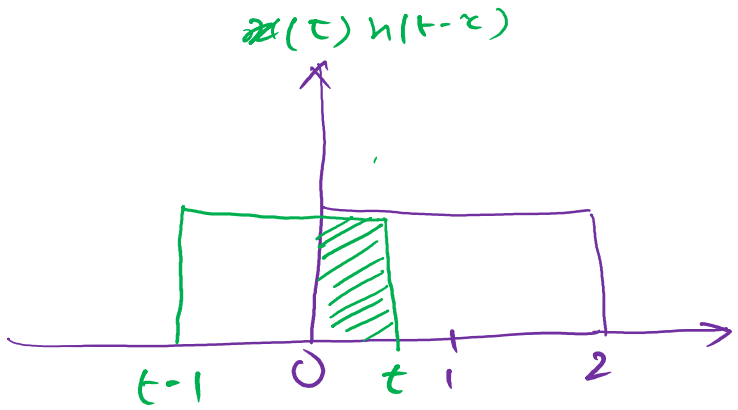




→ Case 1 $t < 0$

Overlapped Region

Shift the previous signal by t unit towards right



Case 2:

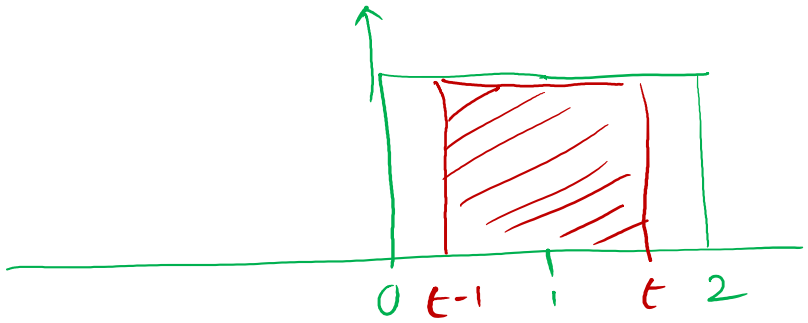
$0 < t < 1$

$$y(t) = \int_0^t 1 \cdot 1 \, d\tau = [\tau]_0^t$$

$$= t.$$

Case 3:-

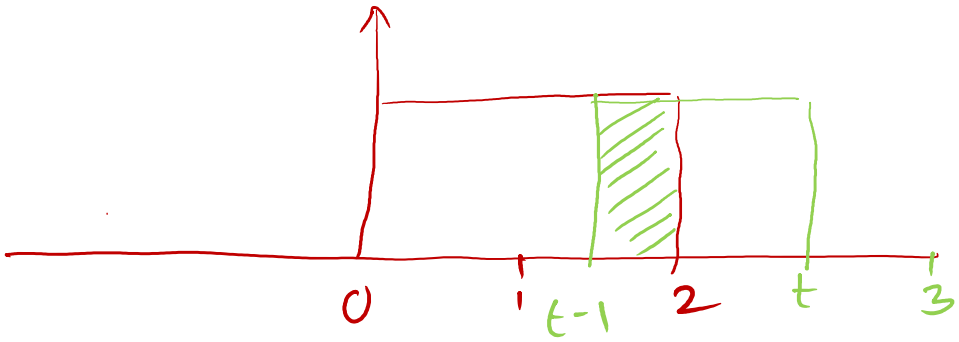
$1 < t < 2$



$$y(t) = \int_{t-1}^{t} 1.1.\,d\tau = (\tau)_{t-1}^{t} = t - t + 1 = 1.$$

Case 4:-

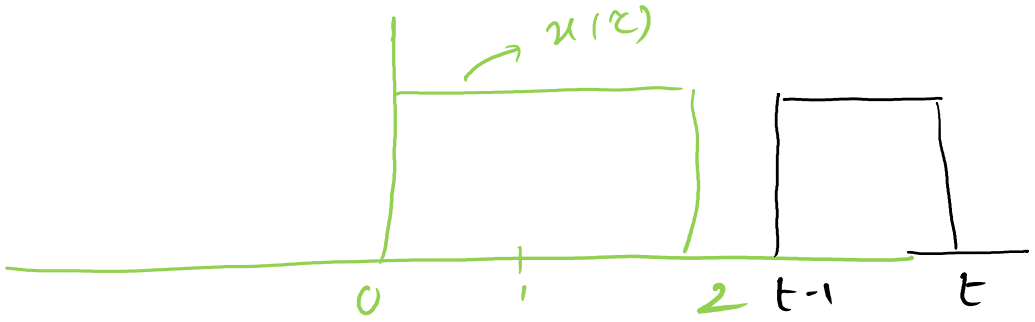
$2 < t < 3$



$$y(t) = \int_{t-1}^{2} 1.1\,d\tau$$

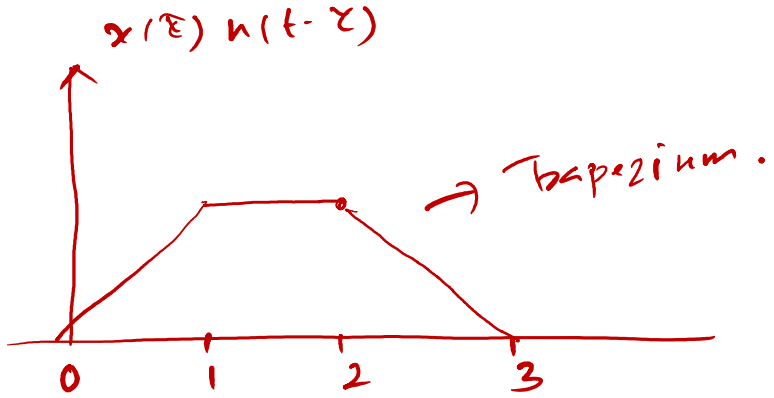
$$= 2 - t + 1 = 3 - t.$$

Case 5:-



No overlapped Region

$y(t) = 0$.



$$y(t) = \begin{cases} 0, & t < 0 \\ t, & 0 < t < 1 \\ 1, & 1 < t < 2 \\ 3-t, & 2 < t < 3 \\ 0, & t > 3 \end{cases}$$

$3 - t$

$3 - 2 = 1$

$3 - t$

$3 - 3 = 0$

Triangular pulse.