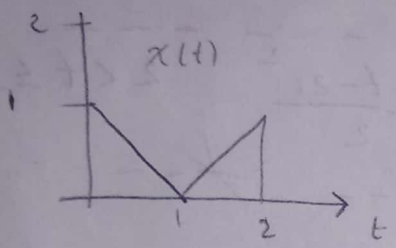
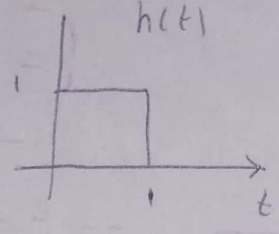
PR03 Montiel Cruz Jorge de Jesús

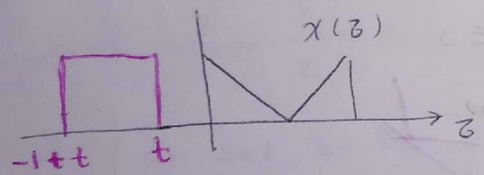
1. Realiza la convolución de las siguientes señales





sea. $x(t) = \begin{cases} -t+1 & 0 \le t < 1 \\ t-1 & 1 \le t \le 2 \\ 0 & \text{otro caso} \end{cases}$ & $h(t) = \begin{cases} 1 & 0 \le t \le 1 \\ 0 & \text{otro caso} \end{cases}$

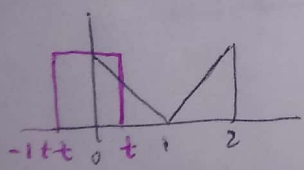
entonces, por método gráfico, hacemos $x(\tau)$ & $h(t-\tau)$



$t<0.$

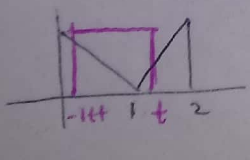
si $g(t) = x(t) * h(t)$ para $t<0$ $g(t)=0$

1



$$\Rightarrow \int_0^t (-\tau+1)\,d\tau = \boxed{-\frac{t^2}{2} + t \qquad 0 \le t < 1}$$

2



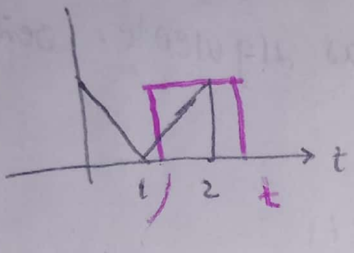
$$\int_{-1+t}^{t} x(\tau)h(t-\tau)\,d\tau = \int_{-1+t}^{1} (-\tau+1)\,d\tau + \int_{1}^{t} (\tau-1)\,d\tau$$

$$= -\frac{\tau^2}{2} + \tau \Big|_{-1+t}^{1} + \frac{\tau^2}{2} - \tau \Big|_{1}^{t}$$

$$= -\frac{1}{2} + \frac{(-1+t)^2}{2} + 1 - (-1+t) + \frac{t^2}{2} - t - \frac{1}{2} + 1$$

$$\boxed{= t^2 - 3t + \frac{5}{2} \qquad 1 \le t \le 2}$$

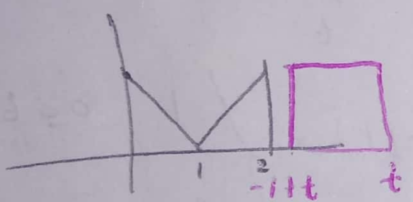
③



$$\int_{-1+t}^{2} (\tau-1)\,d\tau = \left.\frac{(\tau-1)^2}{2}\right|_{-1+t}^{2}$$

$$\boxed{= \frac{1}{2} - \frac{(t-2)^2}{2} \qquad 2 < t \leq 3}$$

④

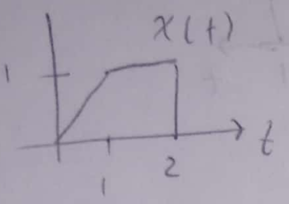


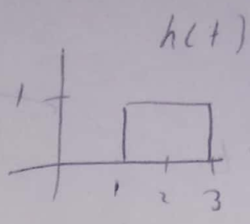
$$\boxed{g(t) = 0 \qquad t > 3}$$

así

$$g(t) = \begin{cases} -\frac{t^2}{2} + t & 0 \leq t < 1 \\ t^2 - 3t + \frac{5}{2} & 1 \leq t \leq 2 \\ \frac{1}{2} - \frac{(t-2)^2}{2} & 2 < t \leq 3 \\ 0 & \text{otro caso.} \end{cases}$$

2. Realice la convolución de las siguientes señales

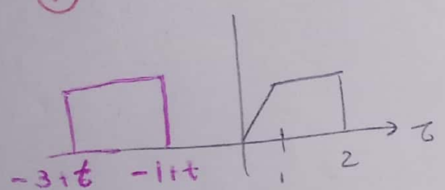




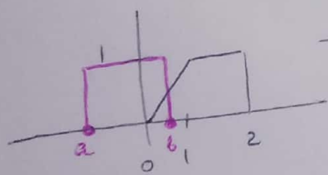
$$g(t) = x(t) * h(t)$$

$$x(t) = \begin{cases} t & 0 \le t \le 1 \\ 1 & 1 < t \le 2 \\ 0 & \text{otro caso} \end{cases} \qquad h(t) = \begin{cases} 1 & 1 \le t \le 3 \\ 0 & \text{otro caso} \end{cases}$$

① $t < 1 \quad g(t) = 0$

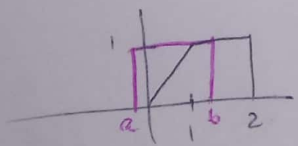


② $a = -3+t \; ; \; b = -1+t$



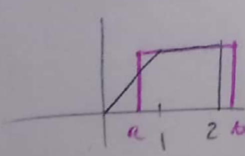
$\rightarrow \int_0^{-1+t} \tau \, d\tau = \frac{(-1+t)^2}{2} \qquad 1 \le t < 2.$

③



$\rightarrow \int_0^1 \tau \, d\tau + \int_1^{-1+t} d\tau = t - \frac{3}{2} \qquad 2 \le t < 3$

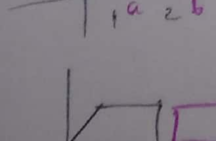
④



$\rightarrow \int_{-3+t}^1 \tau \, d\tau + \int_1^2 d\tau = \frac{1}{2} - \frac{(-3+t)^2}{2} + 1$

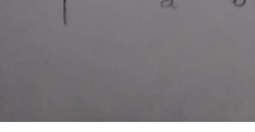
$= -\frac{t^2}{2} + 3t - 3 \qquad 3 \le t < 4$

⑤



$\rightarrow \int_{-3+t}^2 d\tau = 5 - t \qquad 4 \le t < 5$

⑥



$t \geq 5 \quad g(t) = 0$

así pues

$$g(t) = \begin{cases} \frac{(-1+t)^2}{2} & 1 \le t < 2 \\ t - \frac{3}{2} & 2 \le t < 3 \\ -\frac{t^2}{2} + 3t - 3 & 3 \le t < 4 \\ 5 - t & 4 \le t < 5 \\ 0 & \text{otro caso} \end{cases}$$