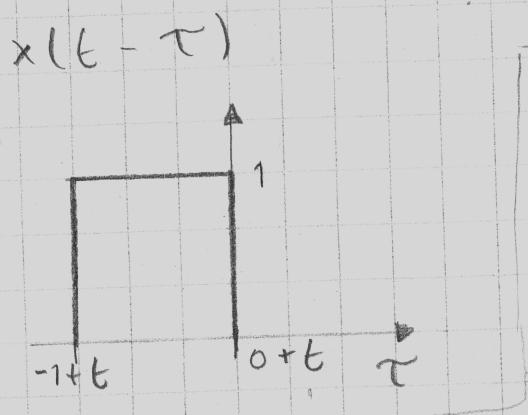
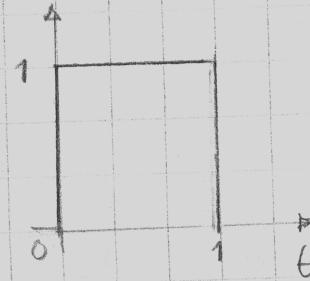
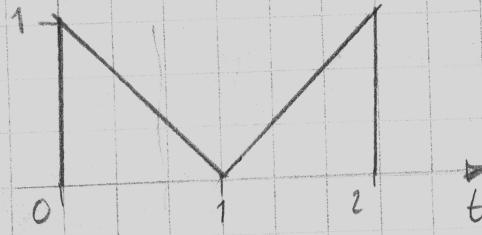


PROY

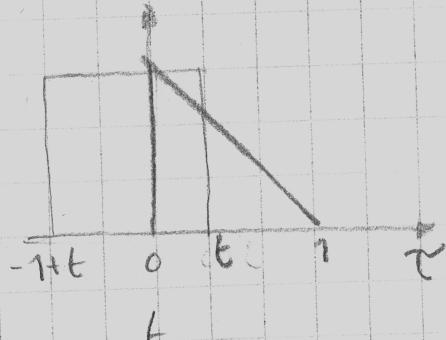
① Realice la convolución de los siguientes señales

$$h(t) = \underbrace{(-t+1)[u(t) - u(t-1)]}_{\text{Parte 1}} + (t-1)[u(t-1) - u(t-2)]$$

$$x(t) = u(t) - u(t-1)$$



(caso ①)



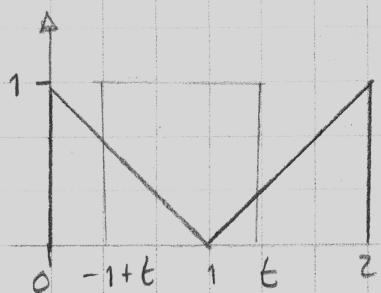
$$0 \leq t \leq 1$$

$$\int_0^t (-\tau + 1)(1) d\tau = \left[-\frac{1}{2}\tau^2 + \tau \right]_0^t = -\frac{1}{2}t^2 + t$$

Caso

(2)

$$1 \leq t \leq 2$$



$$\int_{-1+t}^t (-\tau+1)(1) d\tau + \int_1^t (\tau-1)(1) d\tau$$

$$= \left[-\frac{1}{2}\tau^2 + \tau \right]_{-1+t}^t + \left[\frac{1}{2}\tau^2 - \tau \right]_1^t$$

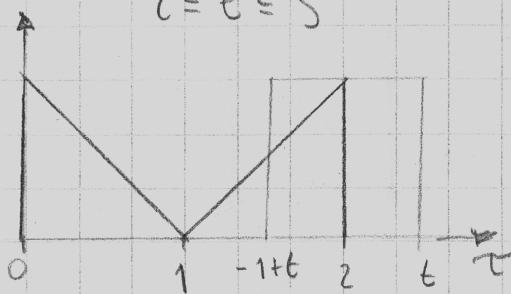
$$= \left[-\frac{1}{2}(1)^2 + 1 + \frac{1}{2}(-1+t)^2 - (-1+t) \right] + \left[\frac{1}{2}t^2 - t - \frac{1}{2} + 1 \right]$$

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

$$= \frac{5}{2} - 3t + t^2$$

Caso (3)

$$2 \leq t \leq 3$$



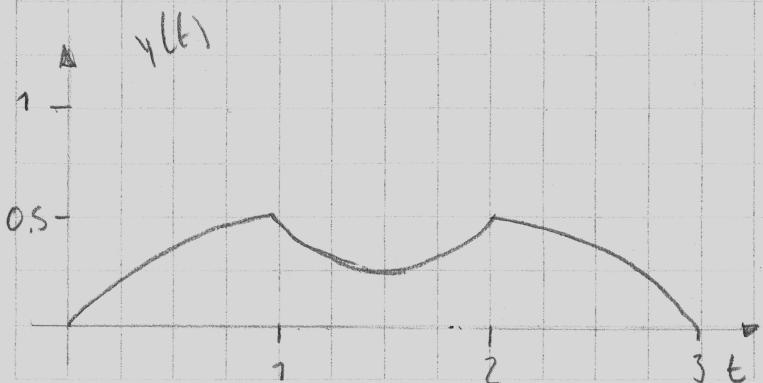
$$\int_{-1+t}^2 (\tau-1) d\tau = \left[\frac{1}{2}\tau^2 - \tau \right]_{-1+t}^2$$

$$= \frac{1}{2}(4) - 2 - \frac{1}{2}(-1+t)^2 + (-1+t)$$

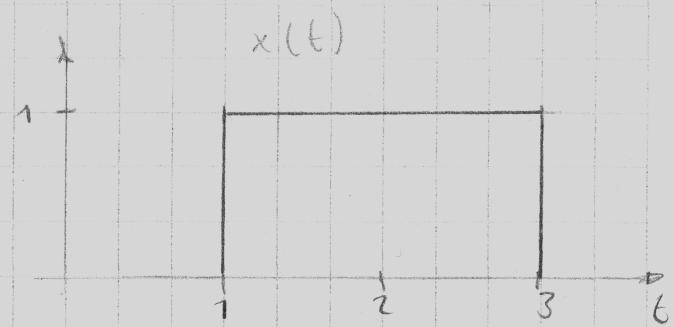
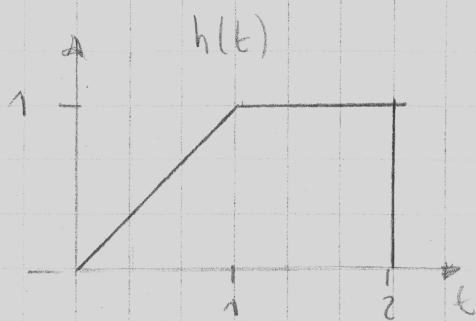
$$= -\frac{1}{2}(1-2t+t^2) + 1 - t$$

$$= -\frac{3}{2} + 2t - \frac{1}{2}t^2$$

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

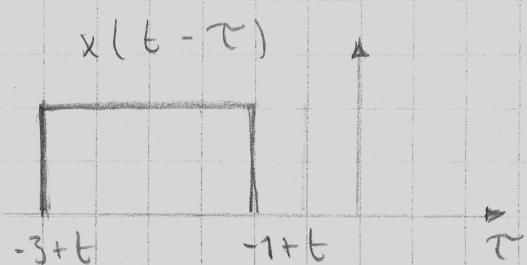
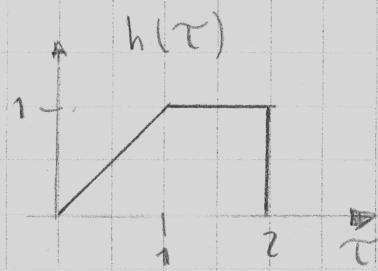


③ Realiza la convolución de las siguientes señales

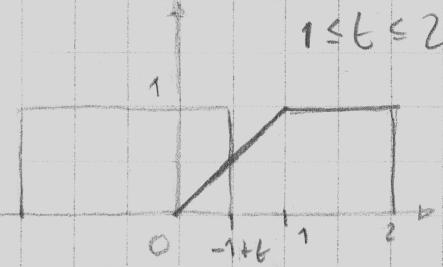


$$h(t) = t[u(t) - u(t-1)] + [u(t-1) - u(t-2)]$$

$$x(t) = u(t-1) - u(t-3)$$



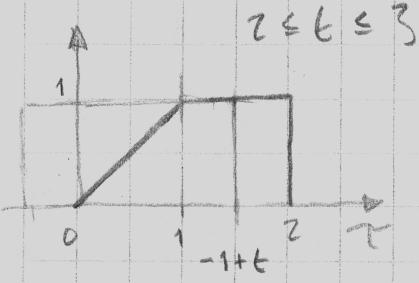
(caso ①)



$$\int_0^{-1+t} \tau d\tau = \frac{1}{2}\tau^2 \Big|_0^{-1+t}$$

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

(caso ②)



$$\int_0^1 \tau d\tau + \int_1^{-1+t} d\tau = \frac{1}{2}\tau^2 \Big|_0^1 + \tau \Big|_1^{-1+t}$$

$$= \frac{1}{2} - 2 + t = t - \frac{3}{2}$$

Caso ③ $3 \leq t \leq 4$

$$= \int_{-3+t}^1 \tau d\tau + \int_1^2 d\tau$$

$$= \frac{1}{2} \tau^2 \Big|_{-3+t}^1 + \tau \Big|_1^2$$

$$= \frac{1}{2} [1 - (-3+t)^2] + 1 = \frac{1}{2} [1 - 9 + 6t - t^2] + 1$$

$$= -4 + 3t - \frac{1}{2}t^2 + 1 = -3 + 3t - \frac{1}{2}t^2$$

Caso ④ $4 \leq t \leq 5$

$$= \int_{-3+t}^2 d\tau = \tau \Big|_{-3+t}^2$$

$$= 2 - (-3+t) = 5-t$$

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

