2.8)

$$x(t) = \begin{cases} t+1 & 0 \le t \le 1 \\ 2-t & 1 < t \le 2 \\ 0 & \text{O.C} \end{cases}$$

$$h(t) = \delta(t+2) + 2\delta(t+1)$$

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

$\tau = -2$ $\quad$ $\tau = -1$

$$y(t) = \int_{-\infty}^{\infty} x(t-\tau) \cdot \left[\delta(\tau+2) + 2\delta(\tau+1)\right] d\tau$$

$$y(t) = x(t+2) + 2x(t+1)$$

$$x(t+2) = \begin{cases} t+3 & -2 \le t \le -1 \\ -t & -1 \le t \le 0 \\ 0 & \text{O.C.} \end{cases} + 2x(t+1) = \begin{cases} 2t+4 & -1 \le t < 0 \\ 4-2-2t & 0 \le t \le 1 \\ 0 & \text{O.C.} \end{cases}$$

$$y(t) = \begin{cases} t+3 & -2 \le t \le -1 \\ t+4 & -1 \le t \le 0 \\ 2-2t & 0 \le t \le 1 \\ 0 & \text{O.C.} \end{cases}$$

2.9) $h(t) = e^{2t}u(-t+4) + e^{-2t}u(t-5)$

$$h(t-\tau) = e^{2(t-\tau)}u(-t+\tau+4) + e^{-2(t-\tau)}u(t-\tau-5)$$

$$h(t) = \begin{cases} e^{2t} & 4 \ge t \\ 0 & 4 < t < 5 \\ e^{-2t} & 5 < t \end{cases}$$

$$h(t-\tau) = \begin{cases} e^{2(t-\tau)} & 4 \ge t-\tau \\ 0 & 4 < t-\tau < 5 \\ e^{-2(t-\tau)} & 5 < t-\tau \end{cases}$$

$$h(t-\tau) = \begin{cases} e^{2(t-\tau)} & \tau \geq t-4 \\ 0 & t-4 > \tau > t-5 \\ e^{-2(t-\tau)} & \tau \leq t-5 \end{cases}$$

B

A

$B = t-4 \qquad A = t-5$

2.10) $x(t) = \begin{cases} 1 & 0 \leq t \leq 1 \\ 0 & \text{o. c} \end{cases}$

$h(t) = x(t/\alpha) \qquad 0 \leq \alpha \leq 1$

$\infty \to \quad 0 \leq t-\tau \leq \alpha$

$$y(t) = \int_{-\infty}^{\infty} x(t-\tau) \cdot x\left(\frac{\tau}{\alpha}\right) d\tau$$

$t \geq \tau \geq t-\alpha$

$0 \leq \frac{\tau}{\alpha} \leq 1$

$\to 0 \leq \tau \leq \alpha$

$$y(t) = \int_0^{\alpha} x\left(\frac{\tau}{\alpha}\right) d\tau + \int_{t-\alpha}^{t} x(\tau)\, d\tau$$

$$= \tau \Big|_0^{\alpha} + \tau \Big|_{t-\alpha}^{t}$$

$$0 \leq \frac{t-\tau}{\alpha} \leq 1$$

$$t \geq \tau \geq t-\alpha$$

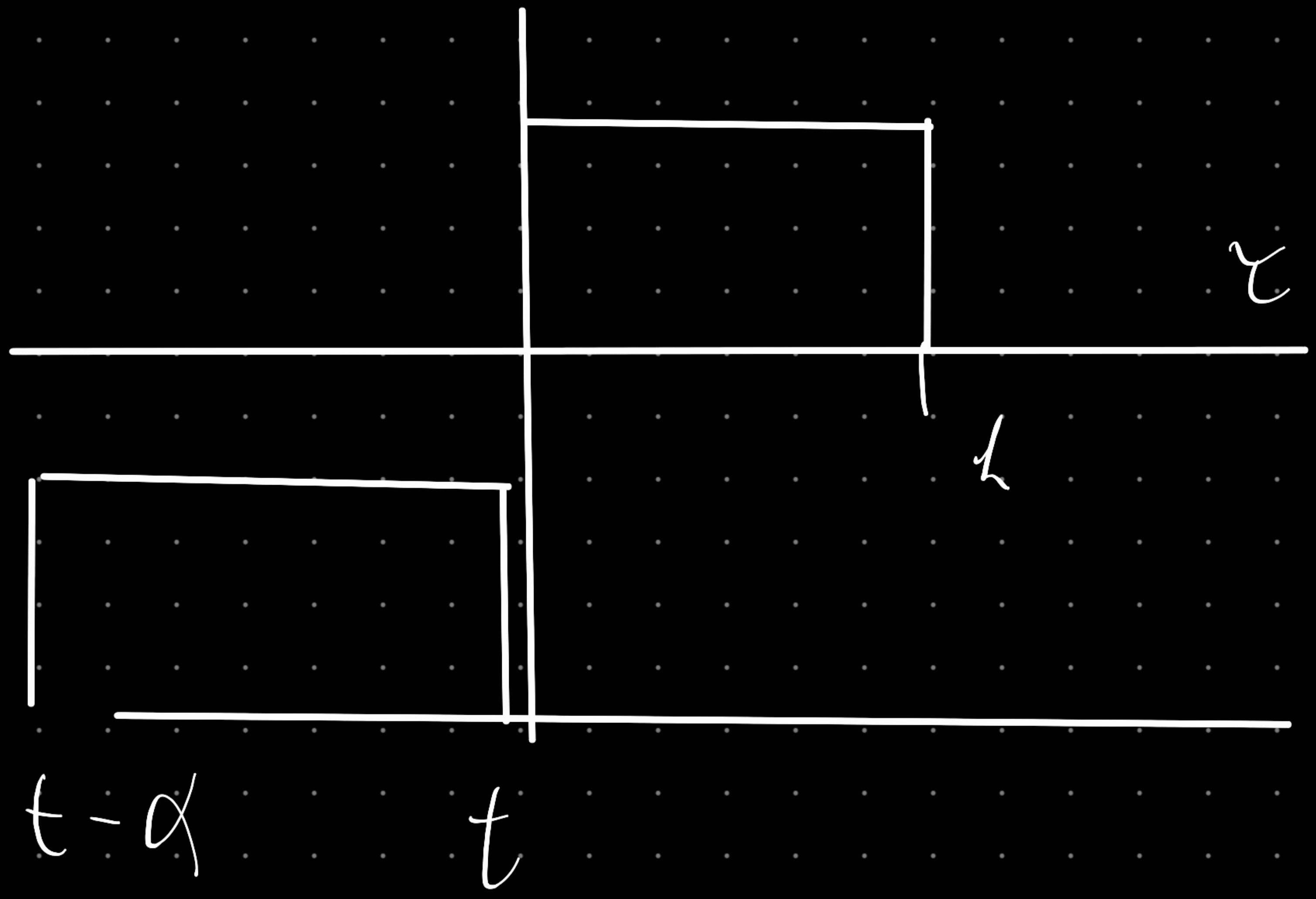
$$x(\tau)\begin{cases} 1 & 0 \le \tau \le 1 \\ 0 & \text{O.C.} \end{cases}$$

$$y(t) = \int_{-\infty}^{\infty} x(\tau) \cdot x\left(\frac{t-\tau}{\alpha}\right) d\tau$$

$$\begin{cases} 1 & 0 \le \tau \le 1 \\ 0 & \text{O.C.} \end{cases} \qquad \begin{cases} 1 & 0 \le \frac{t-\tau}{\alpha} \le 1 \\ 0 & \end{cases}$$

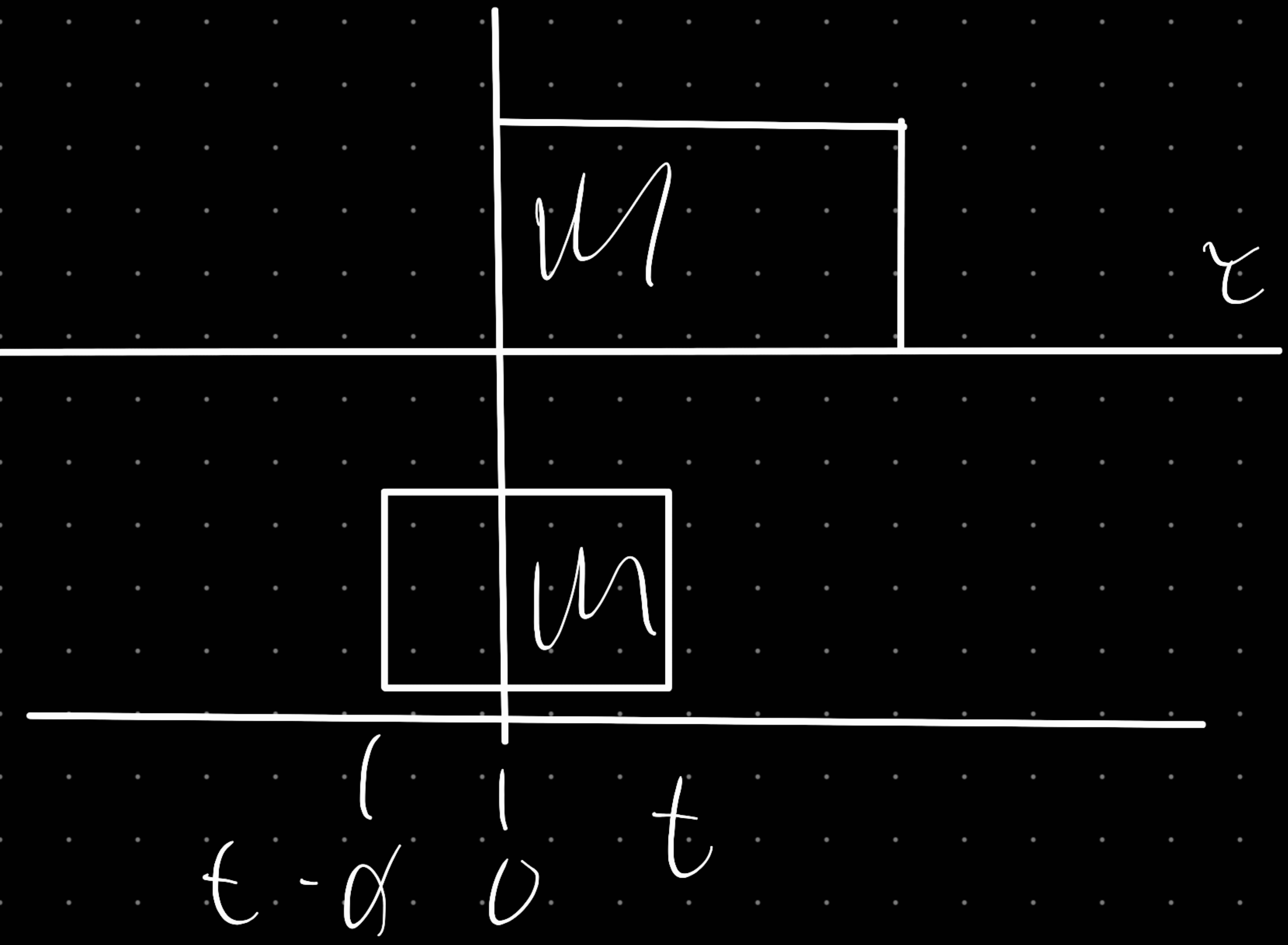
$$t \ge \tau \ge t-\alpha$$

Para $t < 0$



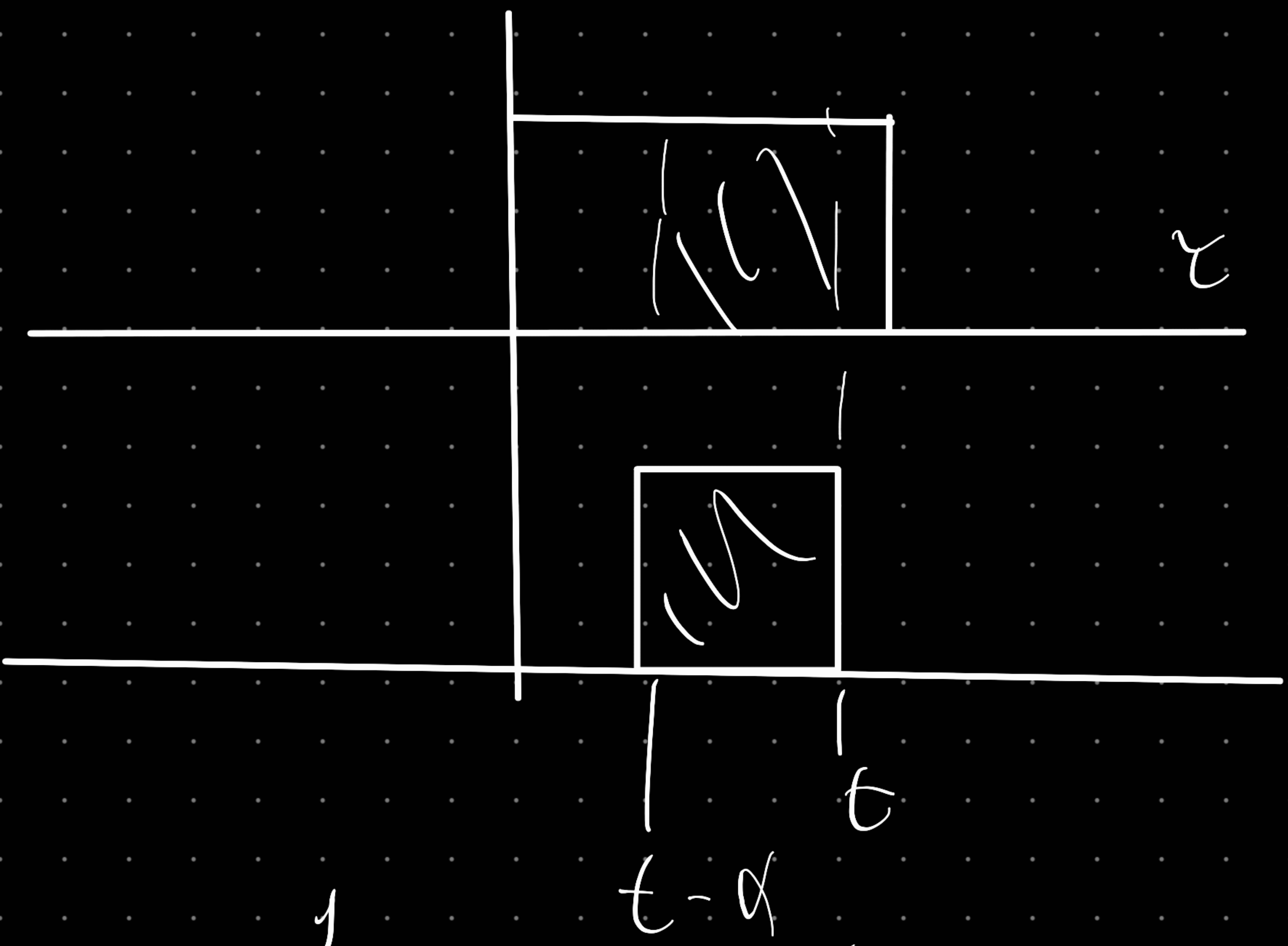

$$y(t) = 0$$

Para $0 < t < \alpha$



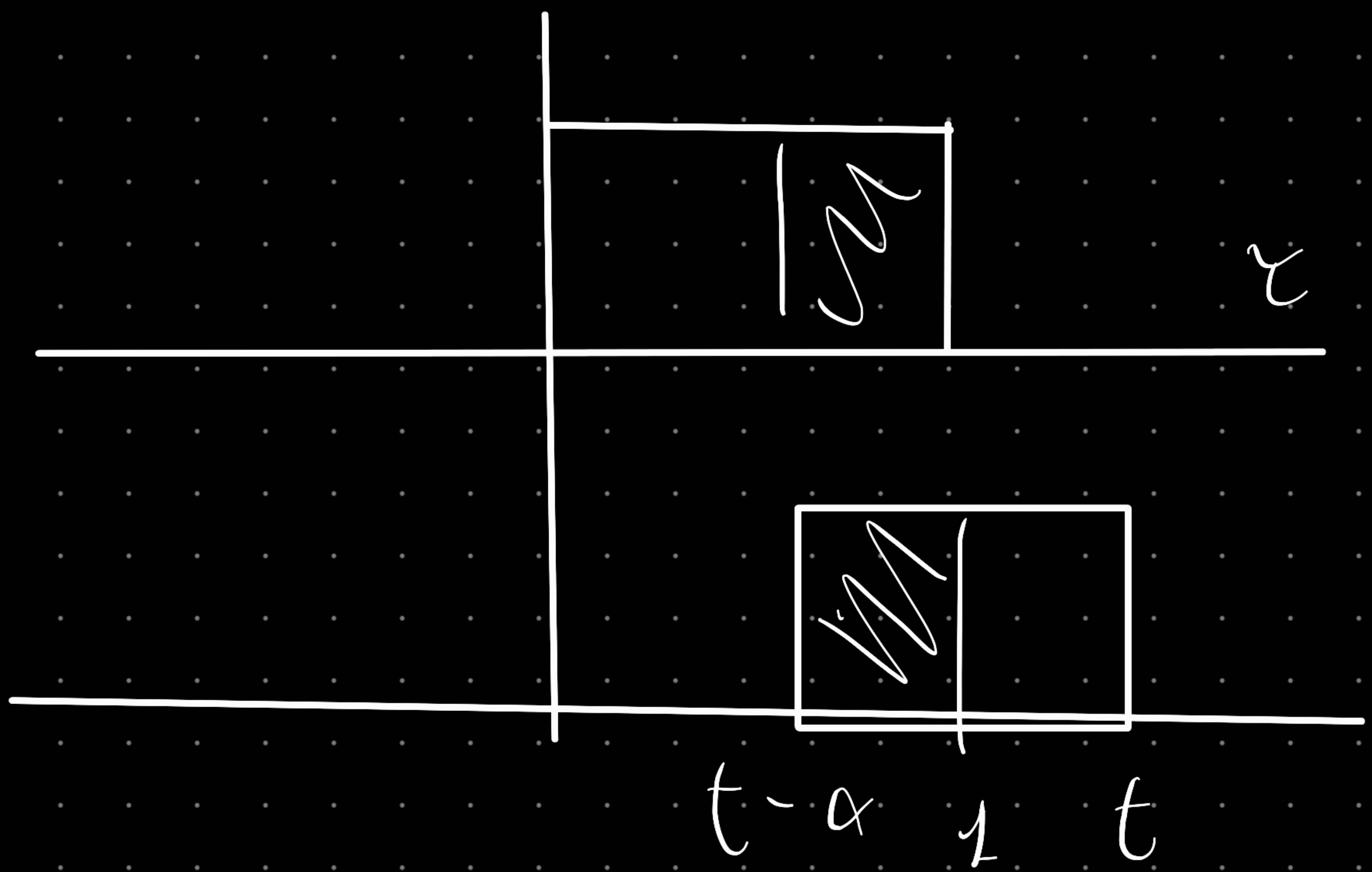
$$\int_0^t d\tau = \tau\Big|_0^t = t$$

Para $\alpha < t < 1$



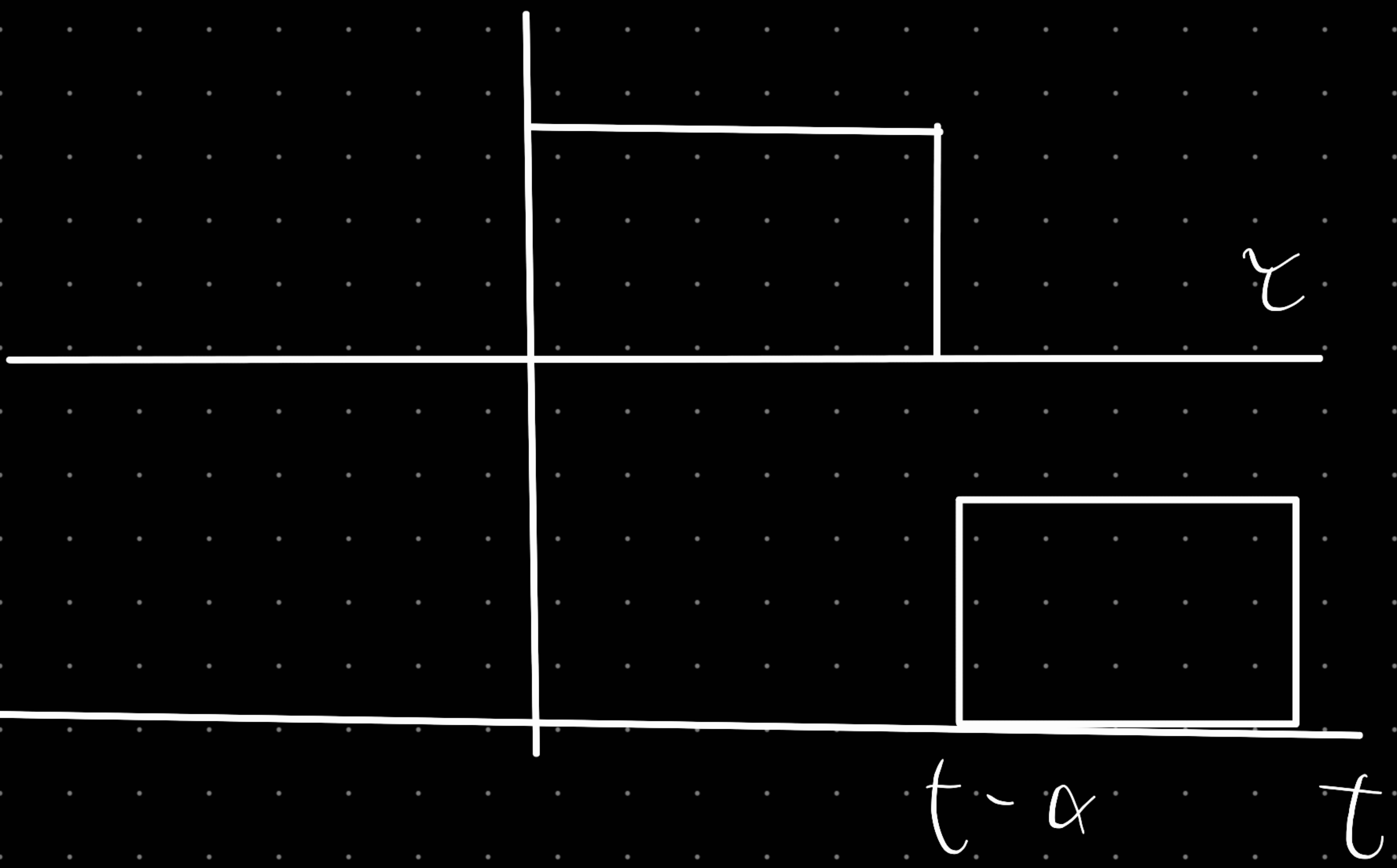
$$\int_{t-\alpha}^{1} d\tau = \tau\Big|_{t-\alpha}^{t} = \cancel{t} + \alpha - \cancel{t}$$

Para $1 < t < 1+\alpha$

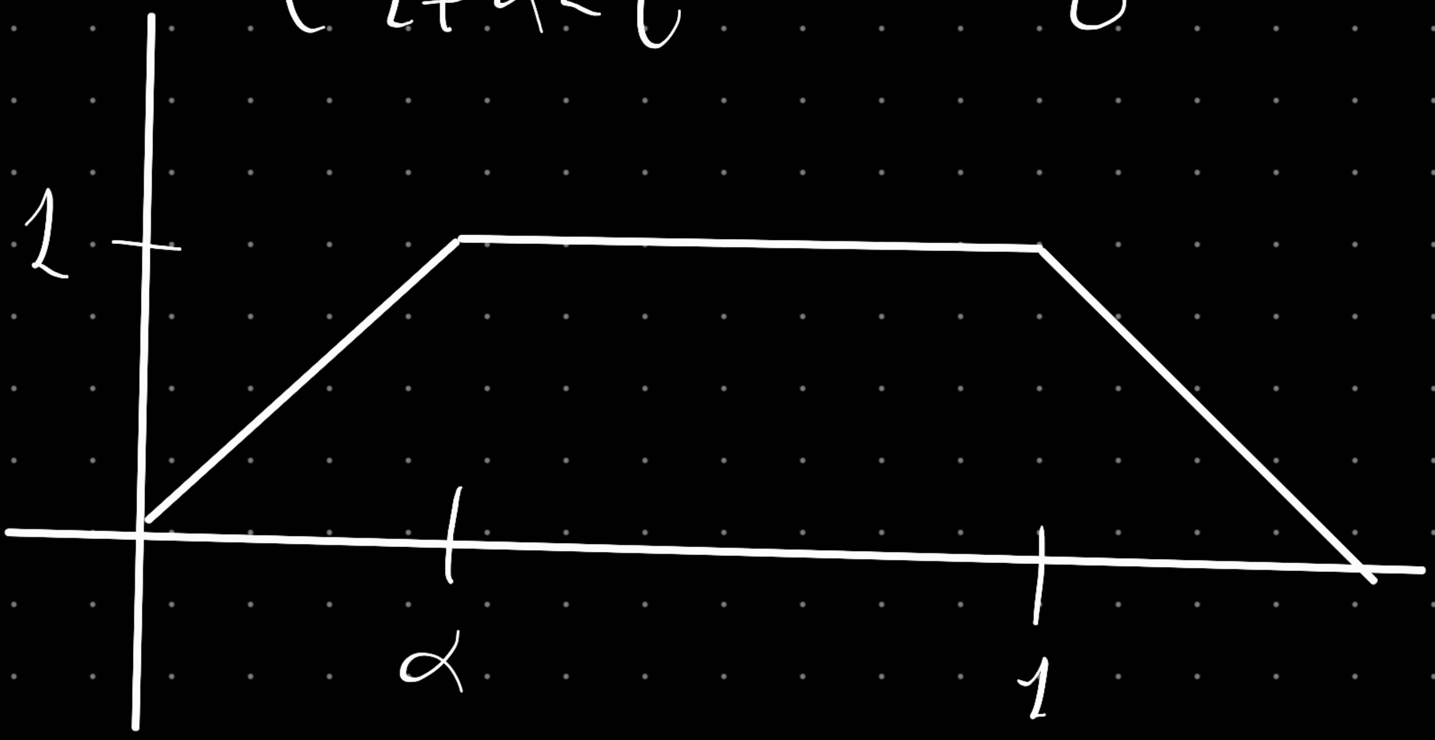



$$\int_{t-\alpha}^{1} d\tau = 1 - t + \alpha$$

Para $1+\alpha < t$



$$y(t) = \begin{cases} t>0 & 0 \\ 0<t<\alpha & t \\ \alpha<t<1 & \alpha \\ 1<t<1+\alpha & 1-t+\alpha \\ 1+\alpha<t & 0 \end{cases}$$




b) $\alpha = 1$ entonces