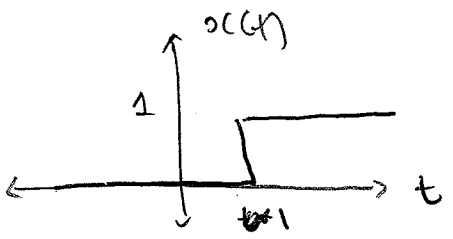
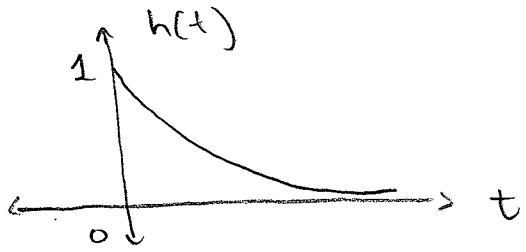
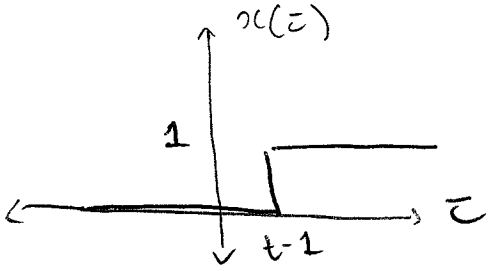
# Problem 5 - Escan 1

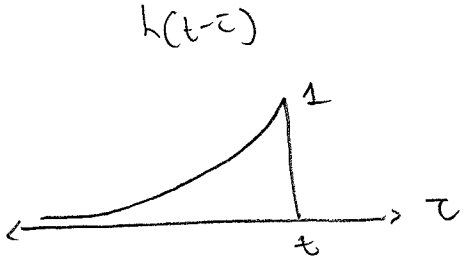
$x(t) = u(t-1)$



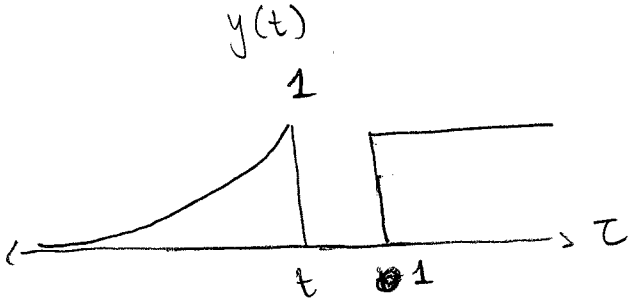

$h(t) = e^{-t}u(t)$



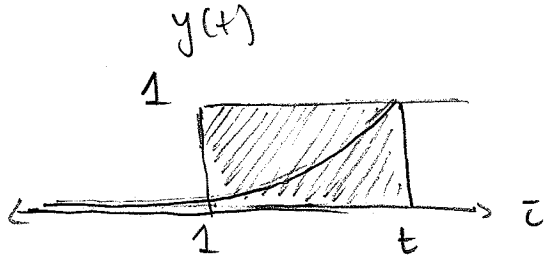




## Interval 1 - $t < 1$




$y(t) = 0$

## Interval 2 -




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

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

$$= \int_1^t e^{-(t-\tau)}\, d\tau$$

$$= e^{-t} \int_1^t e^{\tau}\, d\tau$$

$$= e^{-t} \left[ e^{\tau} \right]_1^t$$

$$= e^{-t}\left[e^{t} - e\right]$$

$$= 1 - e e^{-t}$$

$$= 1 - e^{-t+1}$$

$$= 1 - e^{-(t-1)}$$

$$\therefore\ y(t) = \begin{cases} 0 & t < 1 \\ 1 - e^{-(t-1)} & t > 1. \end{cases}$$

Ans.