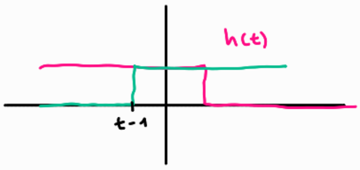
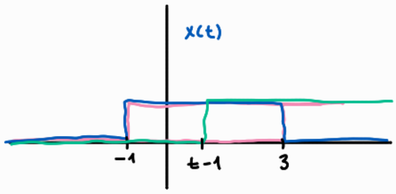
c) $h(t) = e^{t} u(1-t)$ $\quad x(t) = u(t+1) - u(t-3)$



$$h(t-\tau) = e^{(t-\tau)} u(1-(t-\tau)) = e^{(t-\tau)} u(\tau-(t-1))$$

$$x(\tau) = u(\tau+1) - u(\tau-3)$$

$$y(t) = x(t) * h(t) = \int_{-\infty}^{\infty} u(\tau+1) - u(\tau-3)\, e^{(t-\tau)} u(\tau-(t-1))\, d\tau$$



$t-1 < -1 \rightarrow$ $t < 0$ $\quad y(t) = \int_{-1}^{3} e^{t} e^{-\tau} d\tau = -e^{t} e^{-\tau} \Big|_{-1}^{3} = -e^{t}(e^{-3} - e^{1})\, d\tau$

$-1 \leq t-1 \leq 3$

$0 \leq t \leq 4$

$$y(t) = \int_{t-1}^{3} e^{t} e^{-\tau} d\tau = -e^{t} e^{-\tau} \Big|_{t-1}^{3} = -e^{t}(e^{-3} - e^{1-t})$$

$t-1 \geq 3$ $\quad y(t) = 0$

$t > 4$

$$y(t) = \begin{cases} -e^{t}(e^{-3} - e^{1})\, d\tau & t < 0 \\ -e^{t}(e^{-3} - e^{1-t}) & 0 \leq t \leq 4 \\ 0 & t > 4 \end{cases}$$