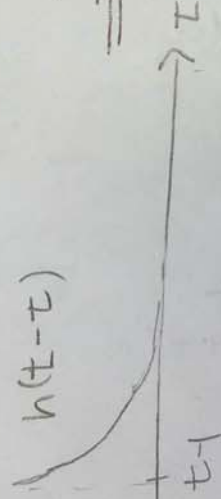
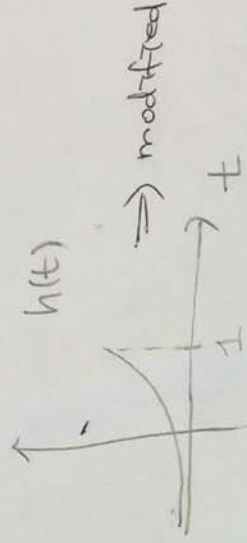
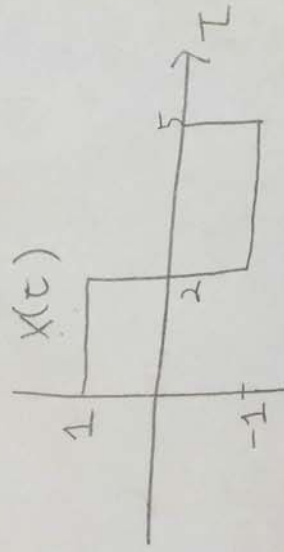


(b) $x(t) = u(t) - 2u(t-2) + u(t-5)$
 $h(t) = e^{2t} u(1-t)$

Express $x(\tau)$ and $h(t-\tau)$ graphically for setting up the

Intervals to calculate $y(t) = x(t) * h(t) = \int_{-\infty}^{\infty} x(\tau) h(t-\tau) d\tau$



By comparing $x(\tau)$ and $h(t-\tau)$, we can set up the intervals.

$$\left\{ \begin{array}{l} t-1 \leq 0 \\ 0 \leq t-1 \leq 2 \\ 2 \leq t-1 \leq 5 \\ t-1 > 5 \end{array} \right. \Rightarrow \text{solve } y(t) \text{ for these intervals.}$$

① for $t-1 \leq 0 \Rightarrow t \leq 1$

$$\begin{aligned} y(t) &= \int_{-\infty}^{\infty} x(\tau) h(t-\tau) d\tau = \int_0^2 e^{2(t-\tau)} d\tau - 2 \int_2^5 e^{2(t-\tau)} d\tau \\ &= e^{2t} \left(-\frac{1}{2}\right) \left[e^{-2\tau} \right]_0^2 - e^{2t} \left(-\frac{1}{2}\right) \left[e^{-2\tau} \right]_2^5 \\ &= \frac{e^{2t}}{2} (e^{-10} - e^{-4} + 1) \end{aligned}$$