

$$a) \quad s(t) = (3-t) [u(t) - u(t-2)]$$

$$\begin{aligned} \therefore h(t) &= \frac{ds(t)}{dt} \\ &= (3-t) \delta(t) - u(t) - (3-t) \delta(t-2) + u(t-2) \\ &= 3\delta(t) - \delta(t-2) - [u(t) - u(t-2)] \\ &= 3\delta(t) - \delta(t-2) - \text{rect}\left(\frac{t-1}{2}\right) \end{aligned}$$

$$b) \quad x(t) = u(t) - u(t-2)$$

$$\text{We know that } u(t) \rightarrow (3-t) [u(t) - u(t-2)]$$

$$u(t-2) \rightarrow (5-t) [u(t-2) - u(t-4)]$$

Since the system is linear,

$$x(t) \rightarrow \underbrace{(3-t)u(t) + (2t-8)u(t-2) + (5-t)u(t-4)}_{y(t)}$$

$$\therefore y(t) = \begin{cases} 3-t & 0 < t < 2 \\ t-5 & 2 < t < 4 \\ 0 & \text{otherwise} \end{cases}$$