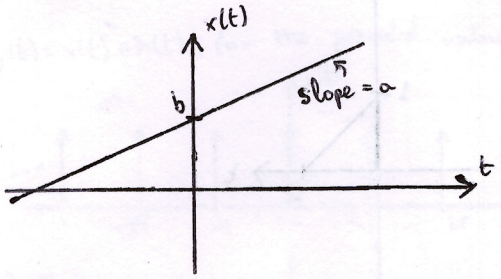
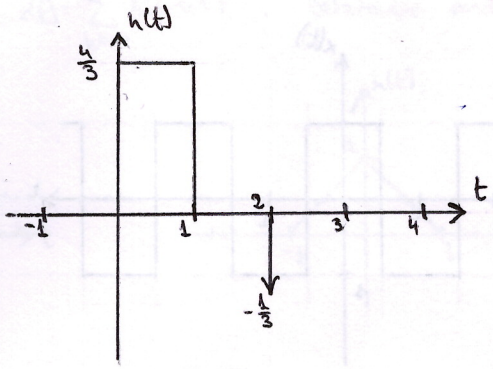
...2.22. (3)

d)





$x(t) = at + b$; $h(t) = \frac{4}{3}u(t)\cdot u(1-t) - \frac{1}{3}\delta(t-2)$

~~$x(t) * h(t) = \int_{-\infty}^{\infty} (at+b)\cdot(\frac{4}{3}u(t)u(1-t$~~

~~$x(t)*h(t) = \int_{-\infty}^{\infty} (at+b)\cdot(\frac{4}{3}u(t-\tau)u(1-t+\tau) - \frac{1}{3}\delta(t-\tau-2))\,d\tau =$~~

$t \geq \tau \geq 0$; $0 \geq \tau \geq 1-t$

$x(t)*h(t) = (at+b)*\left(\frac{4}{3}u(t)u(1-t) - \frac{1}{3}\delta(t-2)\right) = \int_{-\infty}^{\infty} (a\tau+b)\cdot(\frac{4}{3}u(t-\tau)u(1-t+\tau))\,d\tau - \frac{1}{3}(a(t-2)+b) =$

$= \frac{4}{3}\int_{t-1}^{t}(a\tau+b)\,d\tau - \frac{1}{3}(at-2a+b) = \frac{4}{3}\left(a\left(\frac{\tau^2}{2}\right)\Big|_{t-1}^{t} + b(\tau)\Big|_{t-1}^{t}\right) - \frac{1}{3}(a(t-2)+b) =$

$= \frac{4}{3}\left(\frac{a}{2}\left(t^2-(t-1)^2\right) + b(t-(t-1))\right) - \frac{1}{3}(a(t-2)+b) = \frac{4}{3}\left(\frac{a}{2}\cdot\left(t^2-(t^2-2t+1)\right)+b\right) - \frac{1}{3}(a(t-2)+b) =$

$= \frac{2}{3}a\cdot(2t-1) + \frac{4}{3}b - \frac{a}{3}(t-2) - \frac{b}{3} = \frac{4at}{3} - \frac{2a}{3} - \frac{at}{3} + \frac{2a}{3} + b = at + b = x(t)$