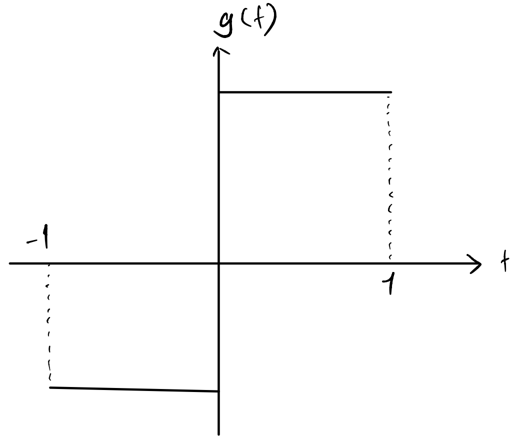
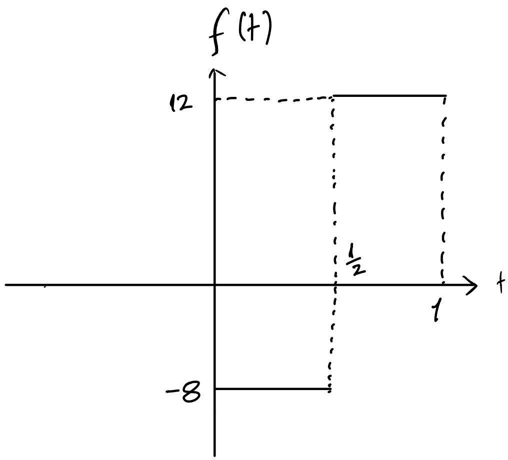
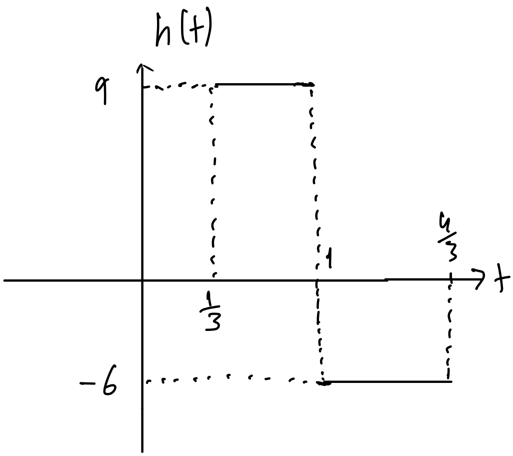


$$g(t) = \begin{cases} -2 & , \text{ if } -1 \leq t < 0 \\ 3 & , \text{ if } 0 < t \leq 1 \\ 0 & \text{otherwise} \end{cases}$$



$$f(t) = 4g(2t-1) = 4g\left(2\left(t-\tfrac{1}{2}\right)\right)$$

- t axis of $g(t)$ is scaled by $\frac{1}{2}$ $\Rightarrow g(2t)$
- $g(2t)$ is shifted by $\frac{1}{2}$ to the right $\Rightarrow g(2t-1)$
- $g(2t-1)$ is scaled by $4 \Rightarrow 4g(2t-1)$



$$h(t) = 3g(-3(t-1))$$

- $g(t)$ is reflected with respect to $g(t)$ axis $\Rightarrow g(-t)$
- t axis is scaled by $\frac{1}{3}$ $\Rightarrow g(-3t)$
- $g(-3t)$ is shifted 1 to the right $\Rightarrow g(-3(t-1))$
- $g(-3(t-1))$ is scaled by 3 $\Rightarrow 3g(-3(t-1))$

$$\tilde{x}(t) = x(t)\sum_{n=-\infty}^{\infty} \delta(t-nT_s) = \sum_{n=-\infty}^{\infty} x(t)\,\delta(t-nT_s) = \sum_{n=-\infty}^{\infty} x(nT_s)\cdot\delta(t-nT_s)$$

$$x(nT_s) = \bar{x}[n]$$

It is desired that $x_R(t) = x(t)$

Interpolation:

$$x_R(t) = \int_{-\infty}^{\infty} \bar{x}(t)\cdot p(t-t')\,dt' = \int_{-\infty}^{\infty} \sum_{n=-\infty}^{\infty} x(nT_s)\,\delta(t'-nT_s)\,p(t-t')\,dt'$$

$$= \sum_{n=-\infty}^{\infty} x(nT_s)\int_{-\infty}^{\infty} \delta(t'-nT_s)\,p(t-t')\,dt' = \sum_{n=-\infty}^{\infty} x(nT_s)\,p(t-nT_s) = x_R(t)$$

Since $p(0)=1$ and $p(kT_s)=0$ for non-zero integers k we have:

$$\boxed{x_R(nT_s) = x(nT_s) = \bar{x}[n]}$$

a) $p_Z(0) = \text{rect}(0) = 1$, $p_L(0) = \text{tri}(0) = 1 - \frac{0}{0.5} = 1$, $p_I(t) = \text{sinc}(0) = 1$

b) $p_Z(kT_s) = \text{rect}(kT_s) = 0$ since $kT_s \neq 0$.

$p_L(kT_s) = \text{tri}\left(\frac{kT_s}{T_s}\right) = \text{tri}(k) = 0$ since, $k = \mp 1, \mp 2, \mp 3 \ldots$ (non-zero integer)

$p_I(kT_s) = \text{sinc}\left(\frac{kT_s}{T_s}\right) = \text{sinc}(k) = \frac{\sin(k\pi)}{k\pi} = \frac{0}{k\pi} = 0$ since, $k = \mp 1, \mp 2 \ldots$ (non-zero integer)

c) As shown above if $p(0)=1$ and $p(kT_s)$ for non-zero integer k, the interpolation is consistent. $p_Z(t)$, $p_L(t)$, $p_I(t)$ are all satisfies this conditions. Therefore, all of them are consistent.