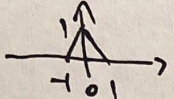
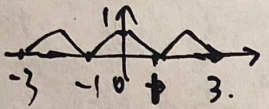


$$1. \int_{-\infty}^t f(\tau) * u(\tau) = \int_{-\infty}^t f(\tau) d\tau$$

$$\rightarrow f(t) * u(t) = \int_{-\infty}^{\infty} f(t-\tau) u(\tau) d\tau = \int_0^{\infty} f(t-\tau) d\tau \stackrel{u=t-\tau}{=} \int_t^{-\infty} f(u) d(t-u) = \int_{-\infty}^t f(u) du$$

2. $f_0(t)$ 图像:  $f(t) = \sum_{n=-\infty}^{+\infty} f_0(t) * \delta(t-2n) = \sum_{n=-\infty}^{+\infty} f_0(t) \cdot \delta(t-2n) [t-2n]$

$\therefore f(t)$ 图像:  $T=2$

$$= \cancel{f_0(t)} \cdot \sum_{n=-\infty}^{+\infty} f_0(t-2n).$$

Q. $f(t) = \sin(t) \cos(2t) + 5 \cos(3t) \sin(4t)$

$$= \frac{1}{2} (\sin(3t) + \sin(-t)) + \frac{5}{2} (\sin(7t) + \sin t)$$

$$= 2 \sin t + \frac{1}{2} \sin 3t + \frac{5}{2} \sin 7t.$$

$\therefore f(t)$ 周期为 2π . $\omega=1$.

$$f(t) = a_0 + \sum_{n=1}^{\infty} (a_n \cos nt + b_n \sin nt).$$

$$= \sum_{n=1}^{\infty} b_n \sin nt.$$

其中 $b_n = \begin{cases} 2, & n=1 \\ \frac{1}{2}, & n=3 \\ \frac{5}{2}, & n=7 \\ 0, & \text{其他} \end{cases}$