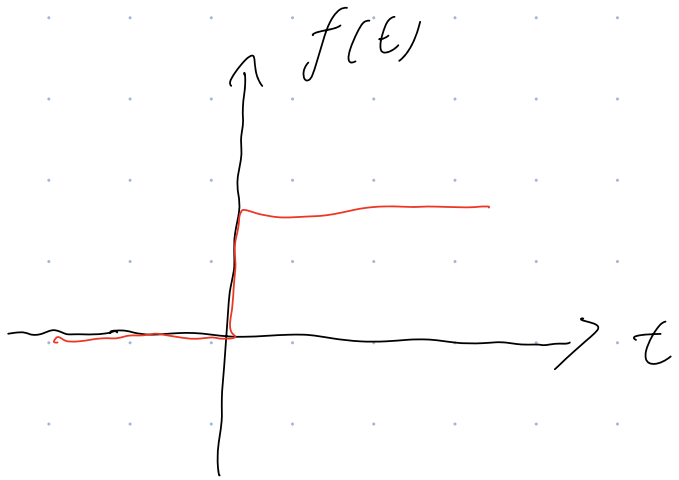
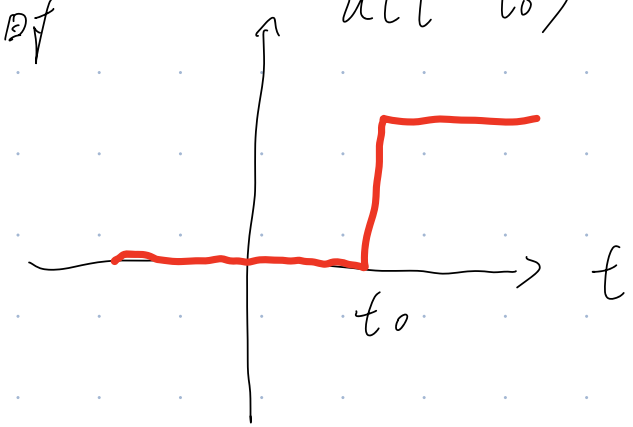
单位阶跃信号 $u(t)$

$$u(t)=\begin{cases}0 & (t<0)\\ 1 & (t>0)\end{cases}$$



延时 $u(t-t_0)$



单位冲激信号 $\delta(t) = \frac{d}{dt} u(t)$

$$\begin{cases} \int_{-\infty}^{+\infty} \delta(t)dt = 1 & \text{强度(面积)} = 1 \\ \delta(t) = 0 \quad (t \neq 0) & \text{宽度无穷小} \end{cases}$$

property

1. 筛分性质 $x(t)\delta(t) = x(0)\delta(t)$

$$\int_{-\infty}^{+\infty} x(t)\delta(t)dt = x(0)$$

2. 尺度运算 $\delta(at) = \frac{1}{|a|}\delta(t)$

3. even func. $\delta(-t) = \delta(t)$

冲激偶信号 $\delta'(t) = \frac{d}{dt}\delta(t)$

$$\int_{-\infty}^{+\infty} \delta'(t) f(t) dt = -f'(0)$$ 筛选性质

$$\int_{-\infty}^{+\infty} \delta'(t) dt = 0$$ $S = 0$

Fourier series

周期信号 $f(t)$，周期 $= T_1$，$\omega_1 = \frac{2\pi}{T_1}$

指数形式

$$f(t) = \sum_{n=1}^{\infty} F_n e^{jn\omega_1 t}$$

$$F_n = \frac{1}{T_1} \int_{-\frac{T_1}{2}}^{\frac{T_1}{2}} f(t) e^{-jn\omega_1 t} dt$$

FT

$$F(w) = \int_{-\infty}^{+\infty} f(t) e^{-jwt} dt$$

$$f(t) = \frac{1}{2\pi} \int_{-\infty}^{+\infty} F(w) e^{jwt} dt$$

$$f(t) \longleftrightarrow F(w)$$