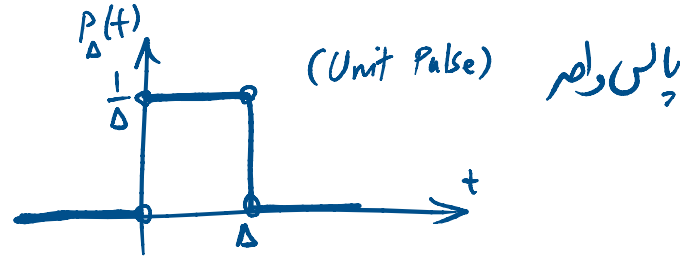
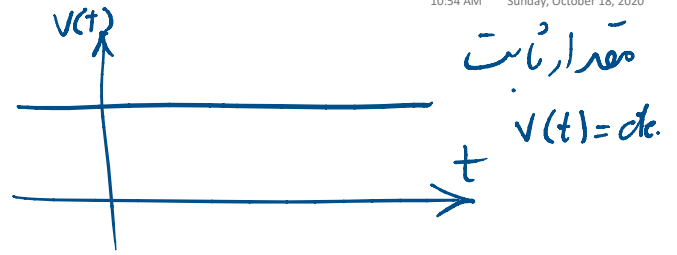


$u(t)$ (Unit Step) پله واحد

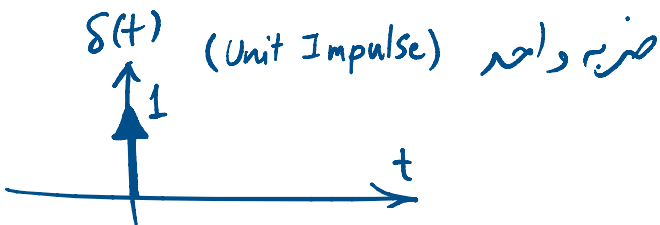


$$u(t) = \begin{cases} 0 & t < 0 \\ 1 & t > 0 \end{cases}$$



$$P_{\Delta}(t) = \begin{cases} 0 & t < 0, t > \Delta \\ \frac{1}{\Delta} & 0 < t < \Delta \end{cases}$$

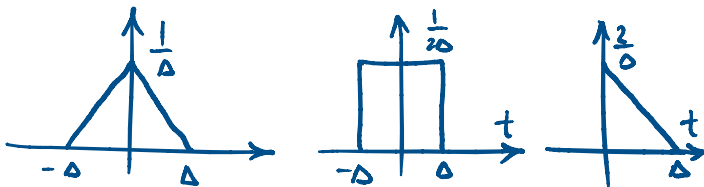
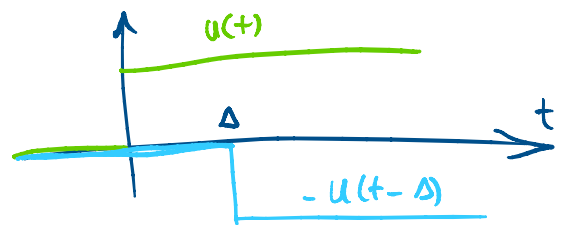
$$P_{\Delta}(t) = \frac{u(t) - u(t - \Delta)}{\Delta}$$



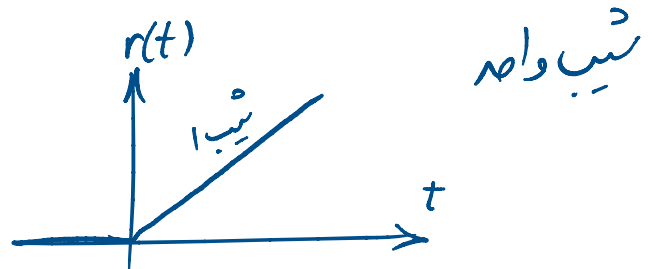
$$\delta(t) = \begin{cases} 0 & t \neq 0 \\ \text{مقدار بی‌نهایت} & t = 0 \end{cases}$$

$$\int_{-\infty}^{+\infty} \delta(t') dt' = 1$$

$$\delta(t) = \lim_{\Delta \rightarrow 0} P_{\Delta}(t) = \frac{d}{dt} u(t)$$



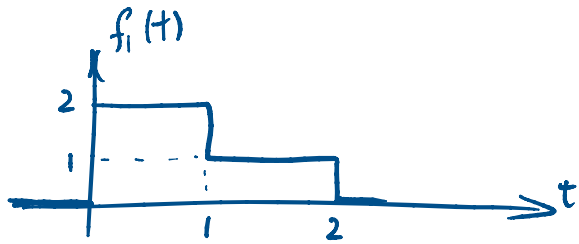
$$u(t) = \int_{-\infty}^t \delta(t') dt'$$



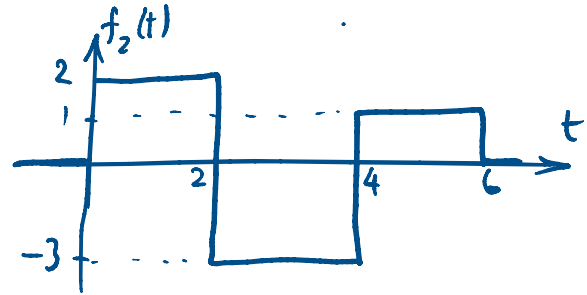
$$r(t) = \begin{cases} 0 & t < 0 \\ t & t \geq 0 \end{cases}$$

$$r(t) = \int_{-\infty}^t u(t') dt', \quad u(t) = \frac{d}{dt} r(t)$$

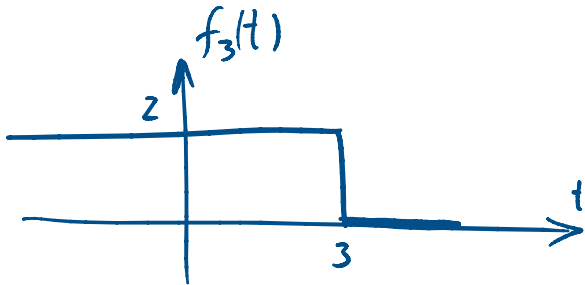
$$r(t) = \int_{-\infty}^t u(t') dt', \quad u(t) = \frac{d}{dt} r(t)$$



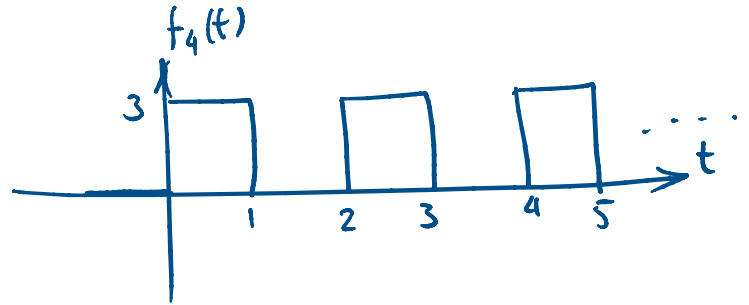
$$f_1(t) = 2u(t) - u(t-1) - u(t-2)$$



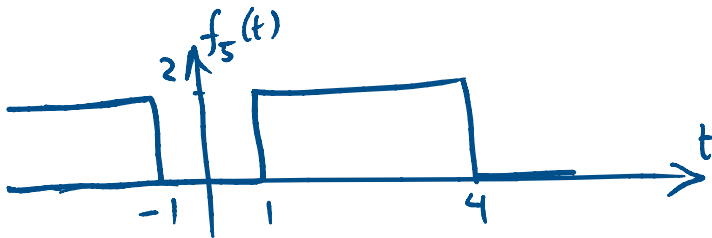
$$f_2(t) = 2u(t) - 5u(t-2) + 4u(t-4) - u(t-6)$$



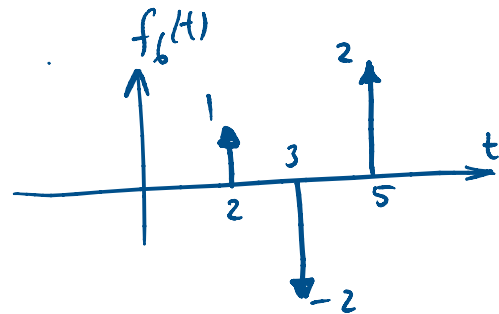
$$f_3(t) = 2u(3-t)$$



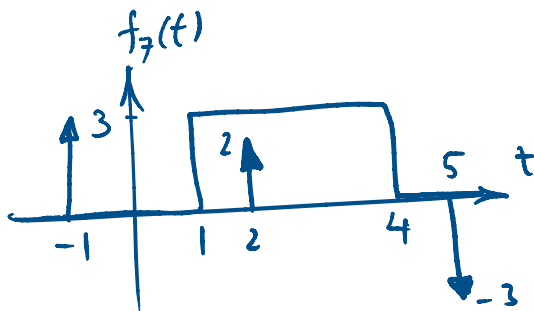
$$f_4(t) = \sum_{K=0}^{\infty} (u(t-2K) - u(t-(2K+1)))$$



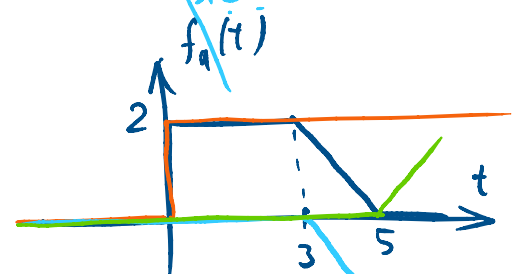
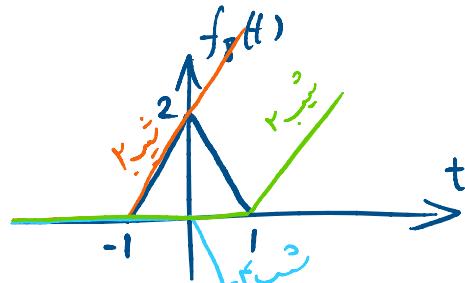
$$f_5(t) = 2u(-t-1) + 2u(t-1) - 2u(t-4)$$



$$f_6(t) = \delta(t-2) - 2\delta(t-3) + 2\delta(t-5)$$

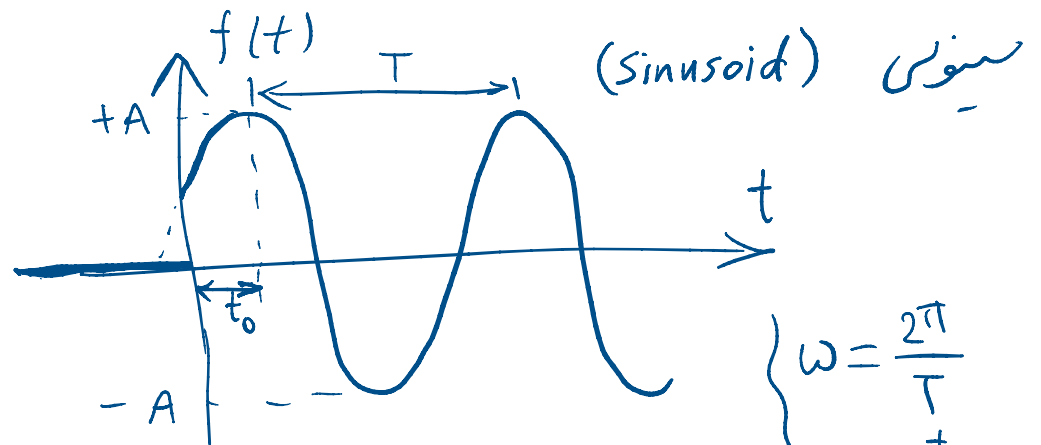


$$f_7(t) = 3u(t+1) - 3u(t-4) + \delta(t+1) + 2\delta(t-2) - 3\delta(t-5)$$



$$f_8(t) = 2r(t+1) - 4r(t) + 2r(t-1)$$

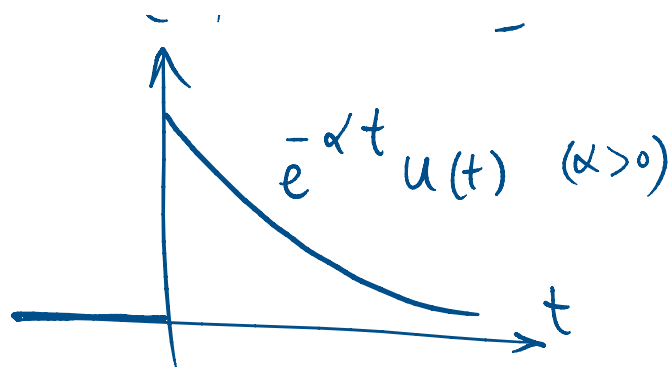
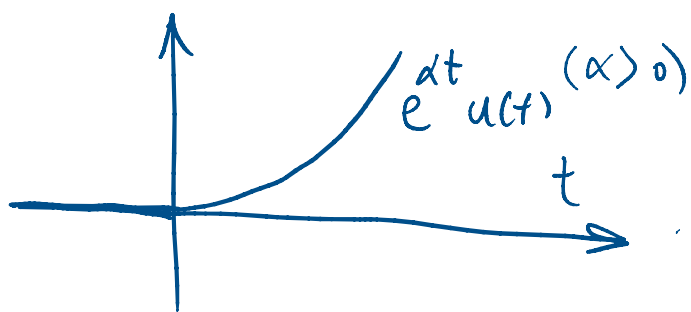
$$f_9(t) = 2u(t) - r(t-3) + r(t-5)$$



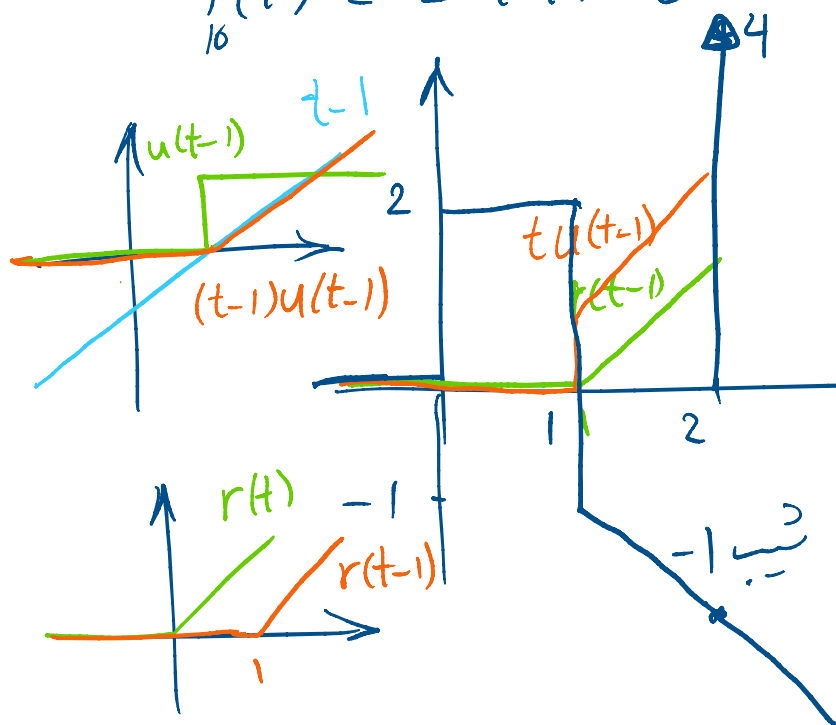
$$f(t) = A \cos(\omega t + \phi) u(t)$$

$$\left\{ \begin{array}{l} \omega = \frac{2\pi}{T} \\ \phi = \frac{-t_0}{T} 2\pi \end{array} \right.$$

(Exponential) ω \uparrow

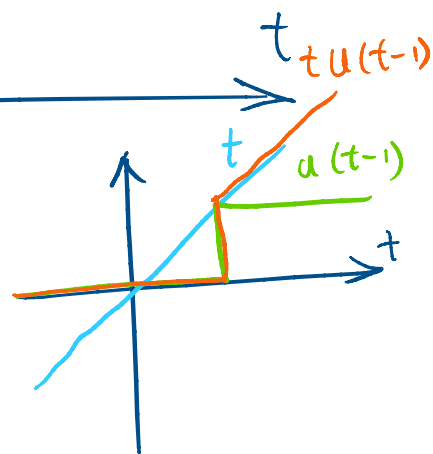


$$f_{10}(t) = 2u(t) - 3tu(t-1) + 4\delta(t-2) + 2r(t-1)$$

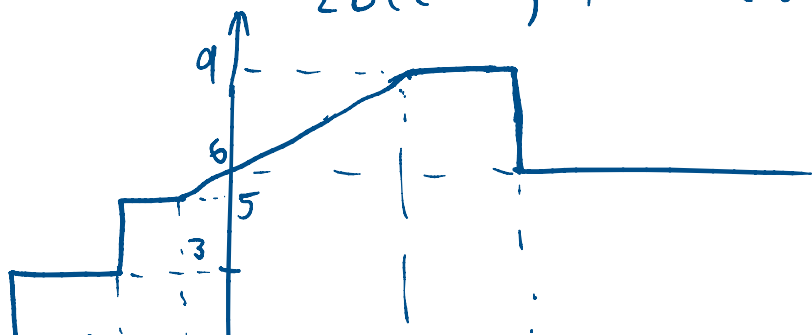


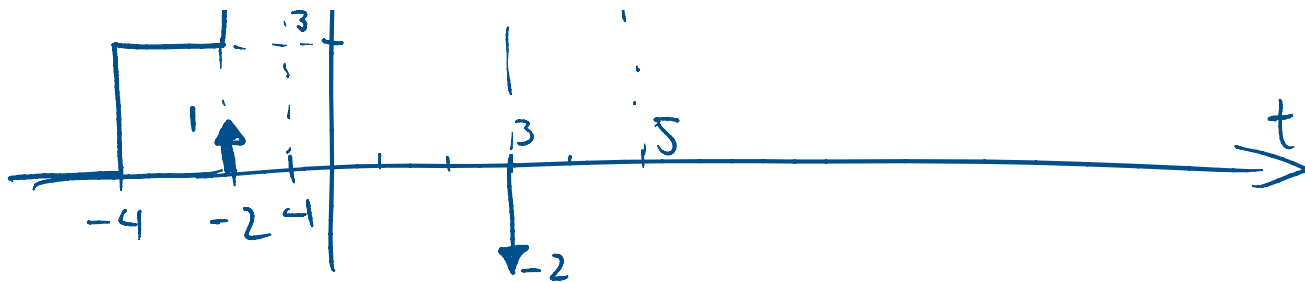
$$r(t) = tu(t)$$

$$r(t-1) = (t-1)u(t-1)$$



$$f_{11}(t) = 3u(t+4) - r(t-3) + \delta(t+2) + r(t+1) - 2\delta(t-3) + 2u(t+2) - 3u(t-5)$$



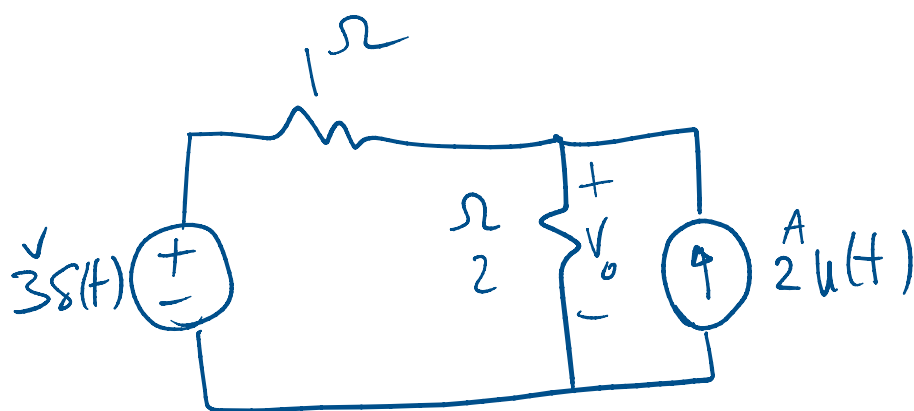


(مدار خطی را تغییر نماند با زمان)

$$f_i(t) = 3u(t-1) - 2\delta(t-2) + 4r(t-3)$$

اگر ورودی $u(t)$ باشد خروجی (پاسخ) $f(t)$ خواهد بود.
پس خروجی برابر $f_i(t)$ است. شرح زیر است.

$$f_o(t) = 3f(t-1) - 2\frac{d}{dt}f(t-2) + 4\int_{-\infty}^t f(t'-3)dt'$$



$$V_o = 2V\delta(t) + \frac{4}{2}V u(t)$$

$$\begin{aligned} V_{o1} &= \frac{2}{2+1} 3V\delta(t) \\ &= 2V\delta(t) \\ V_{o2} &= \left(\frac{1}{2+1} 4A u(t) \right) \frac{\Omega}{2} \\ &= \frac{4}{3}V u(t) \end{aligned}$$

$$V_0 = 2^V \delta(t) + \frac{4}{3}^V u(t)$$

,