$$y(t) = \frac{1}{l}\int_{-\infty}^{t} x(\tau)\,d\tau \qquad ①$$

$$x(t) \longrightarrow \boxed{sys} \longrightarrow y(t)$$

$$x_1(t) = x(t - t_0)$$

$$y_1(t) = \frac{1}{l}\int_{-\infty}^{t} x(\tau - t_0)\,d\tau$$

$$\tau - t_0 = \tau'$$
$$d\tau = d\tau'$$

$$\longrightarrow \quad y_1(t) = \frac{1}{l}\int_{-\infty}^{t-t_0} x(\tau)\,d\tau \qquad ①$$

$$y(t - t_0) = \frac{1}{l}\int_{-\infty}^{t-t_0} x(\tau)\,d\tau \qquad ۲$$

① = ۲ ✓ time invariant

۲

$$y(t) = \frac{1}{R(t)} x(t)$$

$$x(t) \longrightarrow \boxed{\text{sys}} \longrightarrow y(t) = \frac{1}{R(t)} x(t)$$

$$\underline{x(t-t_0)} = z(t) = \frac{1}{R(t)} x(t-t_0) = y_1(t) \quad (1)$$

$$y(t-t_0) = \frac{1}{R(t-t_0)} x(t-t_0) \quad (2)$$

$$(1) \overset{?}{=} (2)$$

×

پس متغیر با زمان

$y(t) = t\,x(t)$ ۳

$x(t) \longrightarrow$ Sys $\longrightarrow y(t) = t\,x(t)$

1

$z(t) = x(t - t_0) \Rightarrow y_1(t) = t\,x(t - t_0)$

$y(t - t_0) = (t - t_0)\,x(t - t_0)$ ۲

۱ $\underset{\times}{\overset{!}{=}}$ ۲ $\longrightarrow$ time varing

$y(t) = x(at)$ ۴

$$x(t) \longrightarrow \boxed{Sys} \longrightarrow y(t)$$

۱ $x(t-t_0) \rightarrow y_1(t) = x(at - t_0)$

$$y(t-t_0) = x(a(t-t_0))$$

۲ $y(t-t_0) = x(at - at_0)$

۱ $\neq$ ۲ $\rightarrow$ time varing

۵

$$y[n] = r^n x[n]$$

$$x[n] \longrightarrow \boxed{Sys} \longrightarrow y[n]$$

$$z[n] = x[n-n_0] \longrightarrow$$

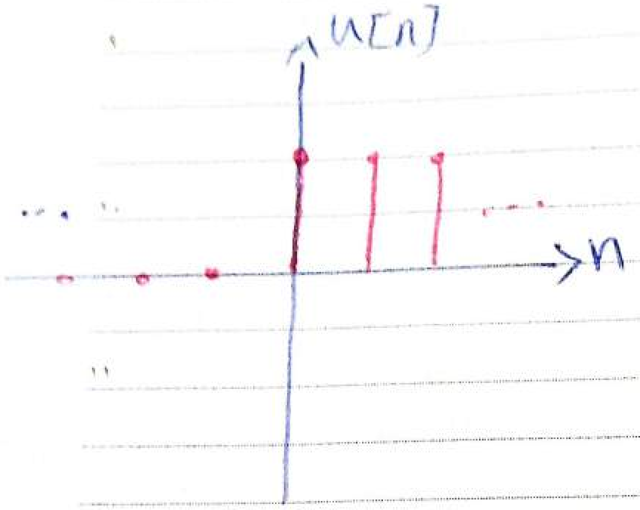
$$y_1[n] = r^n x[n-n_0]$$ 1

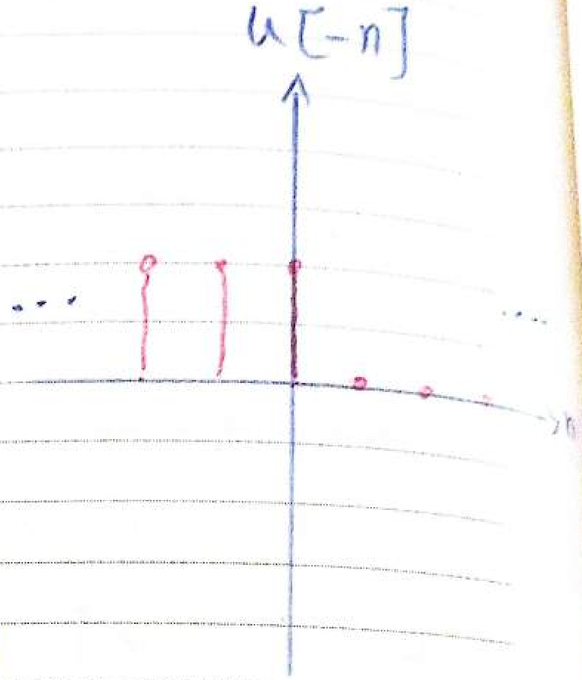
$$y[n-n_0] = r^{n-n_0} x[n-n_0]$$ ۲

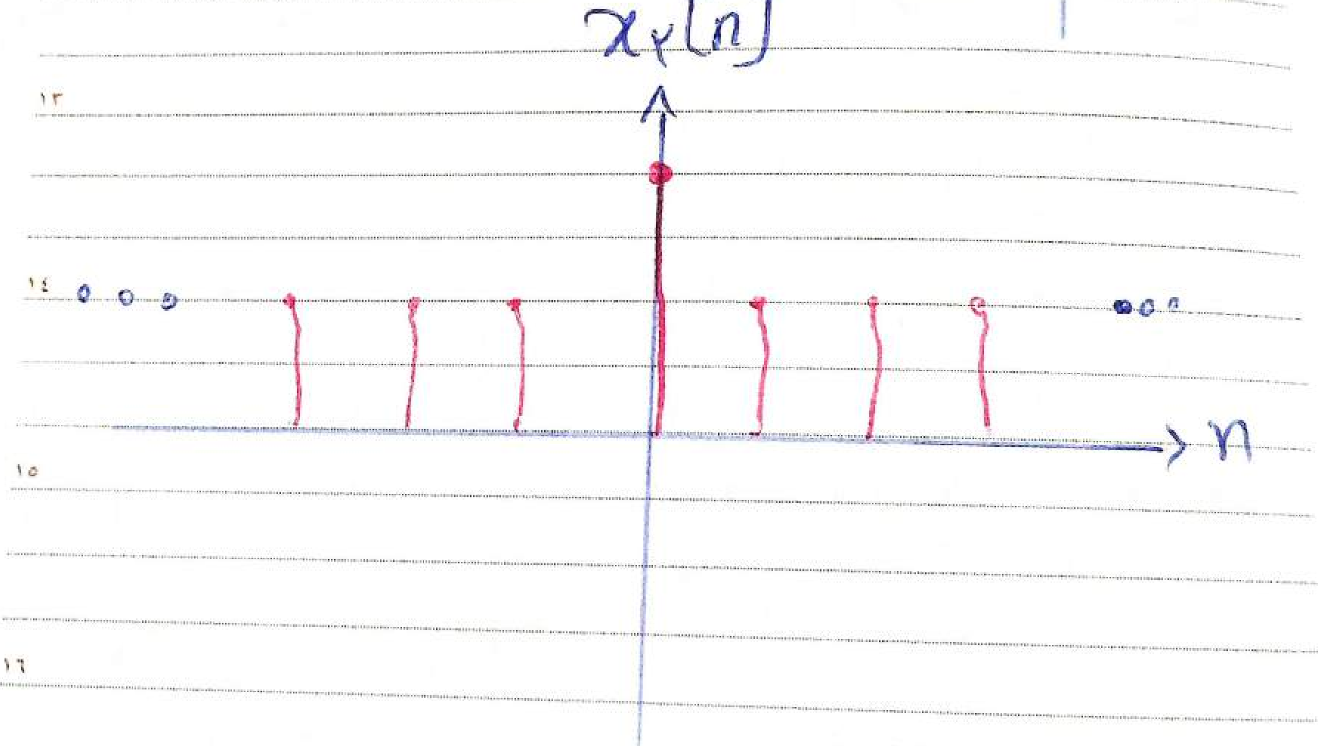
1 $\overset{!}{\underset{\times}{=}}$ ۲ $\longrightarrow$ time varing

۶

$$x_2[n] = u[n] + u[-n]$$

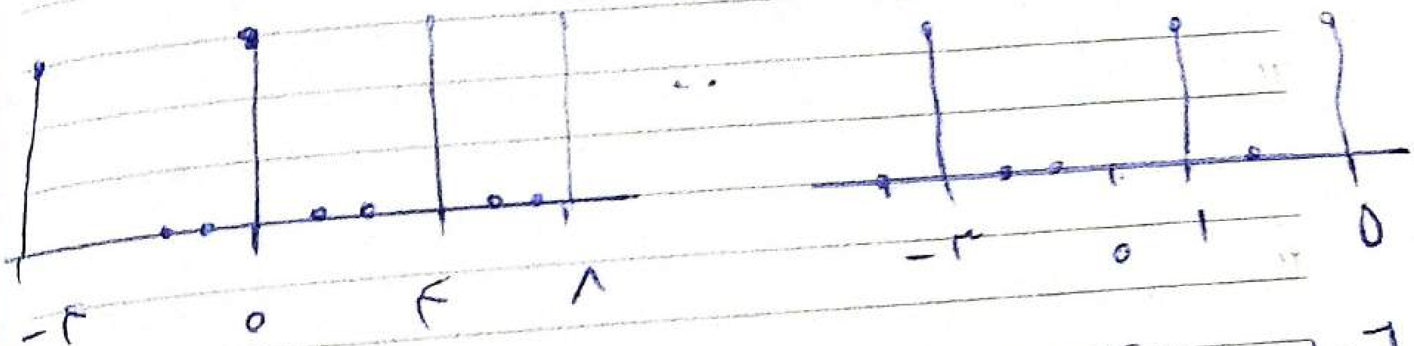




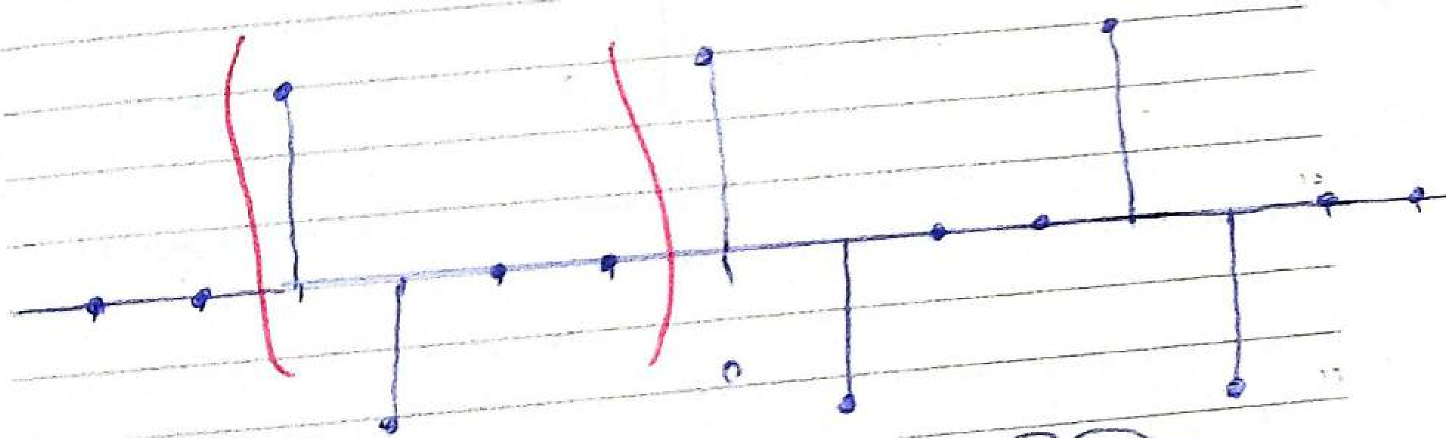


متناوب نیست چون در نقطه صفر مقدار متفاوت است.

$$x_3[n] = \sum_{k=-\infty}^{+\infty} \delta[n-4k] - \delta[n-1-4k]$$ 7



$\delta[n-4k]$ — $\delta[n-1-4k]$



$\boxed{N = 4}$

$x_3[n]$

متناوب با دوره تناوب ۴ میباشد.

$$x[n] = 1 + \underbrace{e^{j\frac{4\pi}{7}n}}_{1} - \underbrace{e^{-j\frac{2\pi}{5}n}}_{2} \qquad (1)$$

$$N_1 = \frac{2k\pi}{\omega} = \frac{\frac{2k\pi}{1}}{\frac{4\pi}{7}} = \frac{14k\pi}{4\pi} \rightarrow = \frac{7k}{2}$$

$$\xrightarrow[k=2]{} \boxed{N_1 = 7} = 14 = 28 = 35 = \dots$$

$$N_2 = \frac{2k\pi}{\omega} = \frac{\frac{2k\pi}{1}}{\frac{2\pi}{5}} = 5k \xrightarrow{k=1}$$

$$\boxed{N_2 = 5} = 10 = 15 = 20 = 25 = 30 = 35 = \dots$$

$$N = 35$$