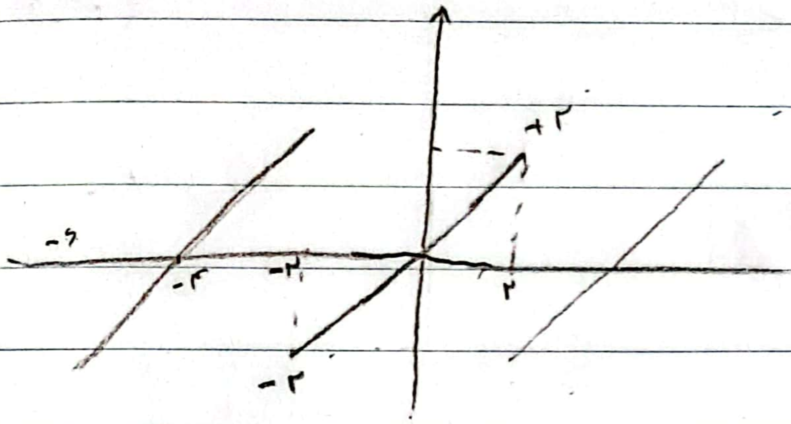
Day.... Month.... Year.......... HW3 Subject..........

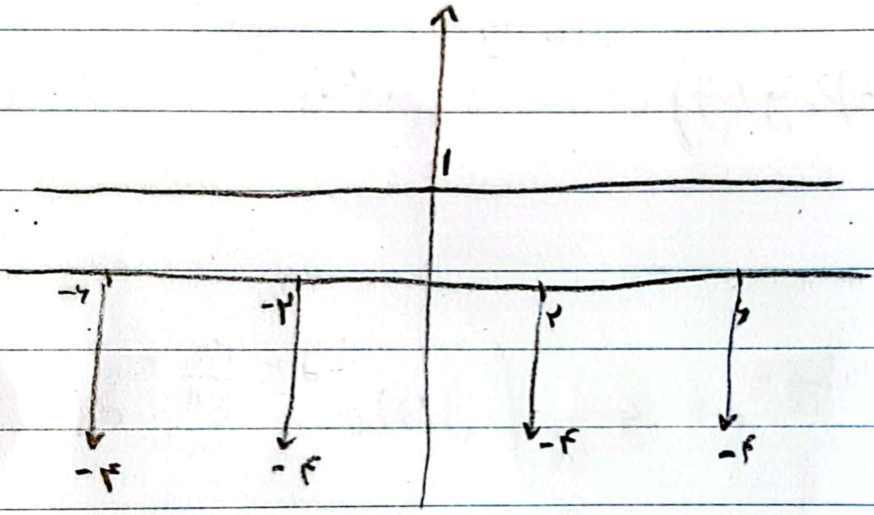
۲_الف)



$T = ۴$

$\omega_0 = \frac{۲\pi}{T} = \frac{\pi}{۲}$

مشتق



$\delta(t) \xleftrightarrow{F.S} \frac{1}{۴}$ قطار ضربه $T = ۴$

$x'(t) = -۴\,\delta(t-۲) + 1$

$jk\omega_0 a_k = -۴ \times \frac{1}{۴}\, ۲ e^{-jk\pi}$ $k \neq 0$

$$a_k = \frac{-e^{-jk\pi}}{jk\frac{\pi}{۲}} \quad k \neq 0$$

$$a_0 = 0 \quad k = 0$$

الف_۳

$$a_k = \frac{1}{6}\int_{T=6} x(t)\, e^{-jk\frac{2\pi}{6}t}\, dt$$

$$b_k = \frac{1}{9}\int_{T=9} y(t)\, e^{-jk\frac{2\pi}{9}t}\, dt$$

$$c_k = \frac{1}{18}\int_{T=18} \big(3x(t) + y(t)\big)\, e^{-jk\frac{2\pi}{18}t}\, dt$$

$$c_k = \frac{1}{18}\int_{T=18} 3x(t)\, e^{-jk\frac{2\pi}{18}t}\, dt + \frac{1}{18}\int_{T=18} y(t)\, e^{-jk\frac{2\pi}{18}t}\, dt$$

تغییر T

$$c_k = 3\,\frac{1}{6}\int_{T=6} x(t)\, e^{-j\frac{k}{3}\frac{2\pi}{6}t}\, dt + \frac{1}{9}\int_{T=9} y(t)\, e^{-j\frac{k}{2}\frac{2\pi}{9}t}\, dt$$

$$c_k = 3\,a_{\frac{k}{3}} + b_{\frac{k}{2}}$$

$$z(t) = x^*(t) + x(-t) \xleftrightarrow{F.S} a^*_{-k} + a_{-k}$$ ۳- ج)

۳- د)

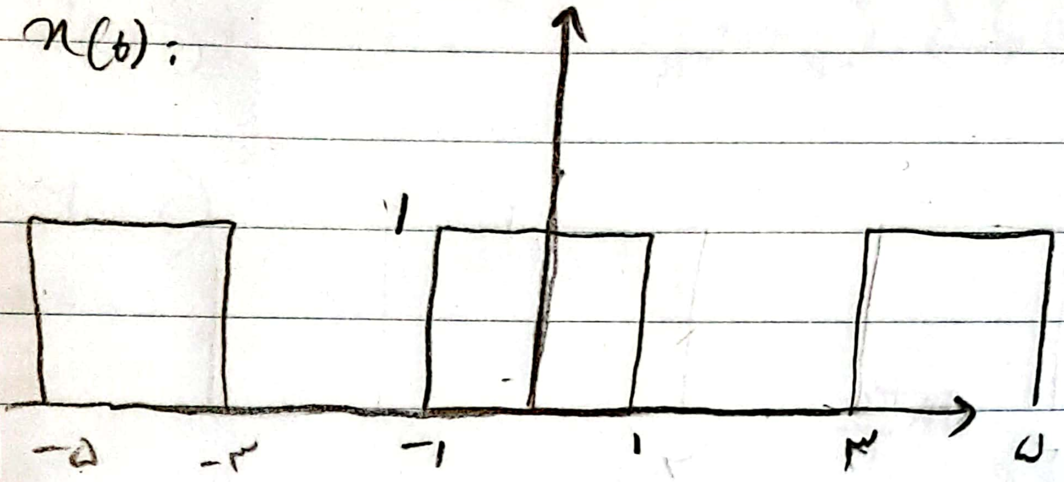
$$x(t) \xleftrightarrow{F.S} a_k$$

$$x(t-۲) \xleftrightarrow{F.S} a_k e^{-jk\frac{۴\pi}{۳}}$$

$$x(۴t-۲) \xleftrightarrow{F.S} a_k e^{-jk\frac{۲\pi}{۲}}$$

۳_الف)

$x(t)$:



$T = ۴$

$\omega_0 = \frac{\pi}{۲}$

$T_1 = ۲$

$$x(t) \xleftrightarrow{F.S} \frac{۲\times۲}{۴} \operatorname{sinc}\left(k \frac{۲\times۲}{۴}\right) = \operatorname{sinc}(k)$$

$$y(t) = x(t-1) + 1$$

$$y(t) \xleftrightarrow{F.S} \operatorname{sinc}(k)\, e^{-jk\frac{\pi}{۲}}$$

$$a_k = \begin{cases} \operatorname{sinc}(k) e^{-jk\frac{\pi}{۲}} & k \neq 0 \\ ۳+۴ & k = 0 \end{cases}$$

۶ـ سیگنال حقیقی $A_k = A_{-k}$

پارسوال: $\frac{1}{T}\int_{-۳}^{۳}|x(t)|^2\,dt = \sum_{k=-\infty}^{+\infty}|a_k|^۲$

$\frac{1}{۶}\times ۳ = |a_{-1}|^۲ + |a_1|^۲ \rightarrow |a_1|^۲ = \frac{1}{۴}$

ج: a_1 مثبت است: $a_1 = a_{-1} = \pm\frac{1}{۲} \Rightarrow$

$a_1 = a_{-1} = \frac{1}{۲}$

$x(t) = \frac{1}{۲}e^{j\frac{\pi}{۳}t} + \frac{1}{۲}e^{-j\frac{\pi}{۳}t}$