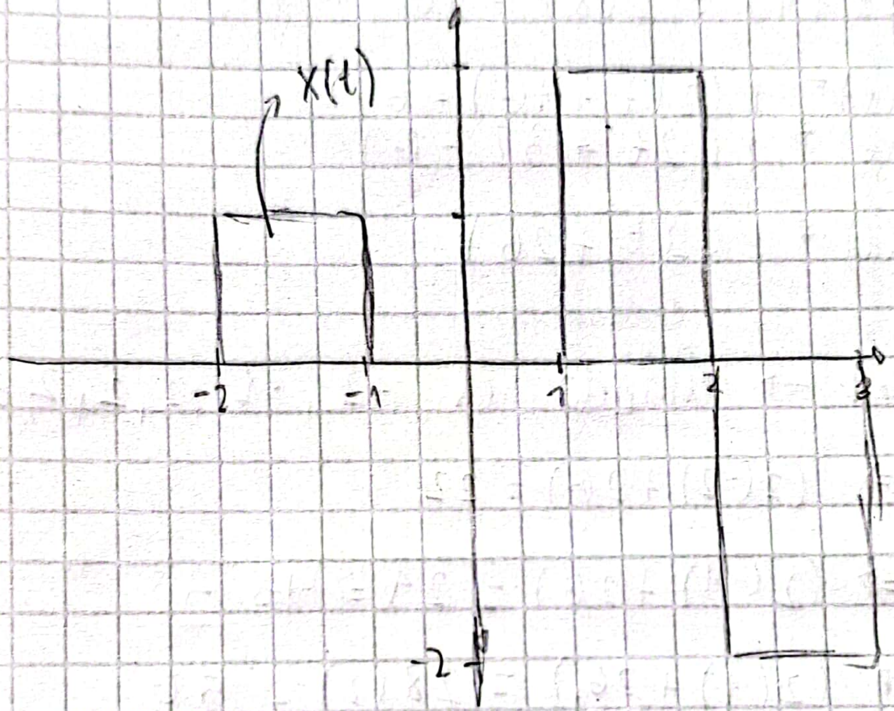
C.C 1003399277 CC 1003399277

Andrea Espinosa Villadiego

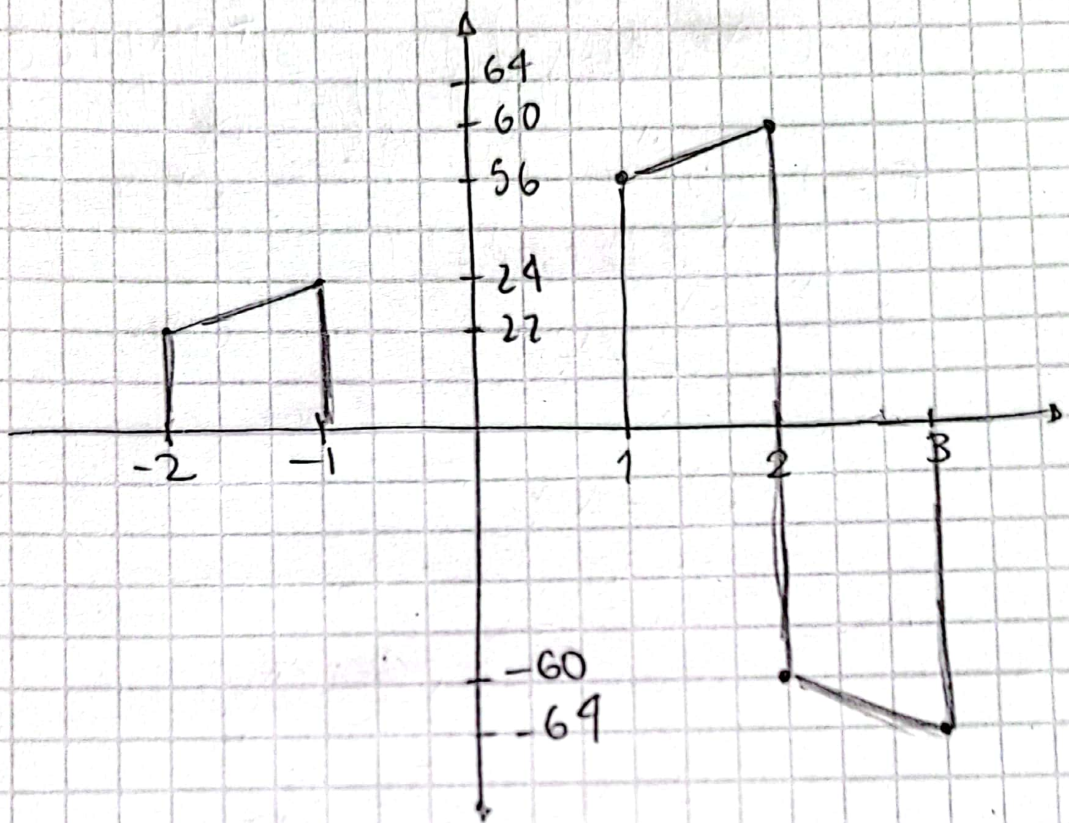
① Construya la señal $z(t) = x(t) + y(t)$ usando señales básicas.



$$x(t) = u(t+2) - u(t+1)$$

$$y(t) = 2u(t-1) - 2u(t-2) - 2u(t-2) + 2u(t-3)$$

$$z(t) = u(t+2) - u(t+1) + 2u(t-1) - 4u(t-2) + 2u(t-3)$$


64
60
56
24
22
-60
-64
-2
-1
1
2
3

③ Encontrar la transformada de Fourier de la siguiente señal =

$x(t) = 4sen(4\pi t + \pi/4) + k\cos(8\pi t) + 5$

con $k = 2(a+1) \rightarrow k = 2(7+1) = 2(8) = 16$

$x(t) = 4sen(4\pi t + \pi/4) + 16\cos(8\pi t) + 5$

Para hallar la transformada tenemos que =

$x_1(t) = 4sen(4\pi t + \pi/4)$

$x_2(t) = 16\cos(8\pi t)$

$x_3(t) = 5$

Entonces, para $x_1(t)$ =

$\mathcal{F}\{4sen(4\pi t + \pi/4)\}$

$4\mathcal{F}\{sen(4\pi t + \pi/4)\} = \frac{4}{2j}\mathcal{F}\{e^{j(sen(4\pi t + \pi/4))} - e^{-j sen(4\pi t + \pi/4)}$

$= \frac{2}{j}\mathcal{F}\{e^{j4\pi t} \cdot e^{\pi/4} - e^{-j4\pi t} \cdot e^{-\pi/4}\}$

$= \frac{2}{j}\left(\mathcal{F}\{e^{j4\pi t} \cdot e^{j\pi/4} \cdot 1\} - \mathcal{F}\{e^{-j4\pi t} \cdot e^{-j\pi/4} \cdot 1\}\right)$

$\frac{2}{j}\left(\mathcal{F}\{e^{j4\pi t}\cdot 1\}e^{j\pi/4} - e^{-j\pi/4}\mathcal{F}\{e^{-j4\pi t}\cdot 1\}\right)$

$$= \frac{2}{j}\left(2\pi\delta(w-4\pi)\cdot e^{j\pi/4} - e^{-j\pi/4}\, 2\pi\delta(w+4\pi)\right)$$

Para $x_3(t) = 5 = 5\cdot 1$

$\mathcal{F}\{\delta(t)\} = 1$

$\mathcal{F}\{1\} = 2\pi\delta(w)$

$\mathcal{F}\{5\} = 2(5)\delta(w) = 10\pi\delta(w)$

Para $x_2(t) = 16\cos(8\pi t)$

tenemos que para $\cos(\theta) = \frac{1}{2}(e^{j\theta} + e^{-j\theta})$

$\frac{16}{2}(e^{j8\pi t} + e^{-j8\pi t})$

$8(e^{j8\pi t} + e^{-j8\pi t})$

$8(\mathcal{F}\{e^{j8\pi t}\} + \mathcal{F}\{e^{-j8\pi t}\})$

$8(2\pi\delta(w-8\pi) + 2\pi\delta(w+8\pi))$

De esto se tiene que la transformada total es
de:

$$\frac{2}{j}\left(2\pi\delta(w-4\pi)\cdot e^{j\pi/4}-e^{-j\pi/4}(2\pi\delta(w+4\pi))\right)$$

$$+\ 8(2\pi\delta(w-8\pi)+2\pi\delta(w+8\pi))+10\pi\delta(w)$$