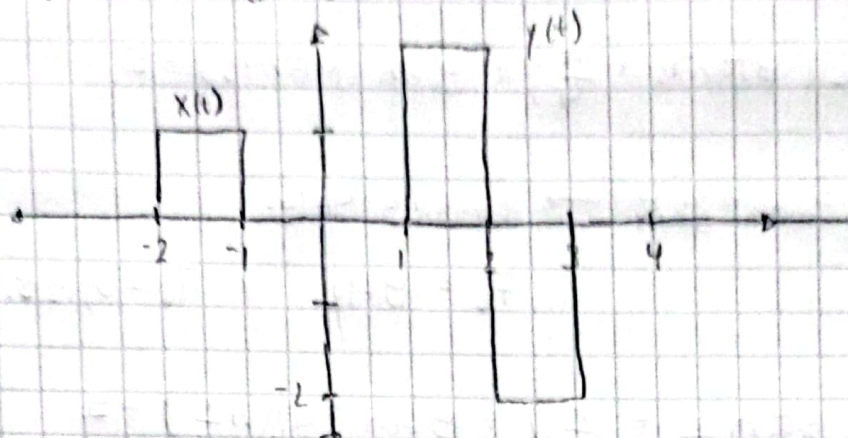


Parcial N°1 Biosonales

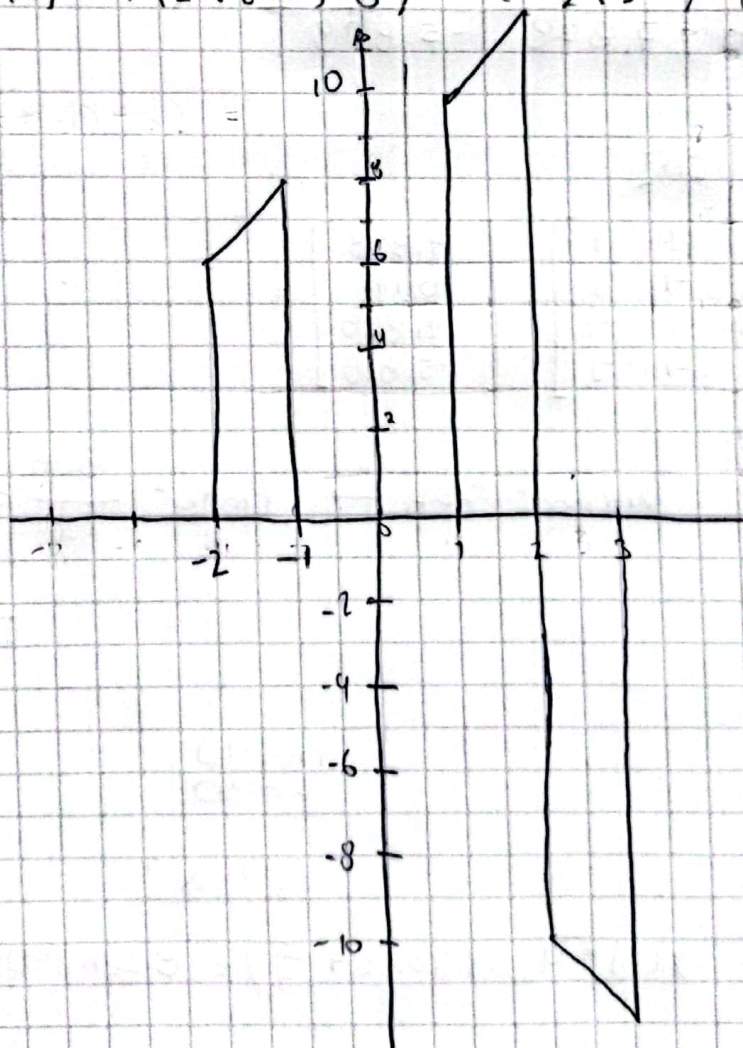
① $z(t) = x(t) + y(t)$



$$x(t) = u(t+2) - u(t+1) \quad y(t) = 2[u(t-1) - u(t-2)] - 2[u(t-2) - u(t-3)]$$

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

② $w(t) = z(t) * r(2(t+k)-6) \quad k = 2(3+1) = 8$



③ Grupo de Luis $x(t) = 4 \cos(8\pi t + \frac{\pi}{4}) + 8 \sin(4\pi t) + 5$

• $x_1(t) = 5$ $\mathcal{F}\{5(t)\} = 5(2\pi \delta(\omega)) = 10\pi \delta(\omega)$

• $x_2(t) = 8 \sin(4\pi t)$ $\mathcal{F}\{A \sin(2\pi f_0 t)\} = \frac{A}{2j} [\delta(\omega - \omega_0) - \delta(\omega + \omega_0)]$

$$\mathcal{F}\{8 \sin(4\pi t)\} = \frac{8}{2j} [\delta(\omega - 2) - \delta(\omega + 2)]$$

$$= 4j [\delta(\omega - 2) - \delta(\omega + 2)]$$

• $x_3 = 4 \cos(8\pi t + \frac{\pi}{4})$ $\mathcal{F}\{A \cos(2\pi f_0 t + \phi)\} = \frac{A}{2} [\delta(\omega - \omega_0) + \delta(\omega + \omega_0)] e^{j\phi}$

$$\mathcal{F}\{4 \cos(8\pi t + \frac{\pi}{4})\} = \frac{4}{2} [\delta(\omega - 4) + \delta(\omega + 4)] e^{j\frac{\pi}{4}}$$

$$= 2 [\delta(\omega - 4) + \delta(\omega + 4)] \left(\frac{1}{\sqrt{2}} + j \frac{1}{\sqrt{2}} \right)$$

Entonces

$$x(t) = 4 \cos(8\pi t + \frac{\pi}{4}) + 8 \sin(4\pi t) + 5 \xrightarrow{\mathcal{F}} 2 \left(\frac{1}{\sqrt{2}} + j \frac{1}{\sqrt{2}} \right) [\delta(\omega - 4) + \delta(\omega + 4)] + 10\pi \delta(\omega) + 4j [\delta(\omega - 2) - \delta(\omega + 2)]$$

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$$= 2 [\delta(\omega - 4) + \delta(\omega + 4)] \left(\frac{1}{\sqrt{2}} + j \frac{1}{\sqrt{2}} \right)$$

Entonces

$$x(t) = 4 \cos(8\pi t + \frac{\pi}{4}) + 8 \sin(4\pi t) + 5 \xrightarrow{\mathcal{F}} 2 \left(\frac{1}{\sqrt{2}} + j \frac{1}{\sqrt{2}} \right) [\delta(\omega - 4) + \delta(\omega + 4)] + 10\pi \delta(\omega) + 4j [\delta(\omega - 2) - \delta(\omega + 2)]$$