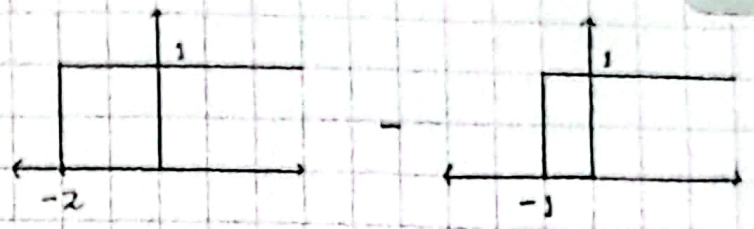
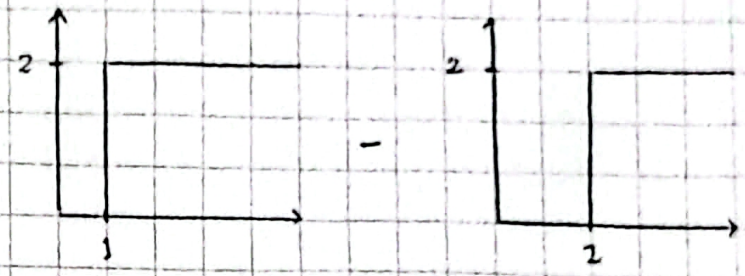
1)

$x(t) = u(t+2) - u(t+1)$ ⟶



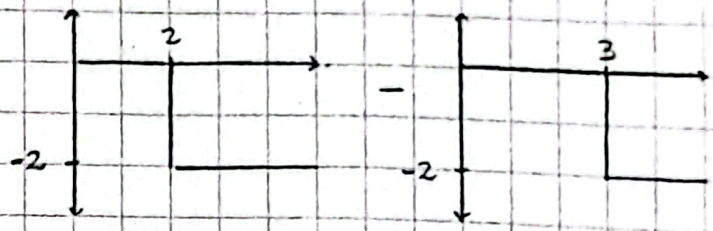
• Para $1 \leq t < 2$:

$y_1(t) = 2 \cdot [u(t-1) - u(t-2)]$ ⟶



• Para $2 \leq t \leq 3$:

$y_2(t) = -2 \cdot [u(t-2) - u(t-3)]$ ⟶



$z(t) = x(t) + y(t)$

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

$z = 1$ para $-2 \leq t < -1$

$z = 0$ // $-1 \leq t < 1$

$z = 2$ // $1 \leq t < 2$

$z = -2$ // $2 \leq t \leq 3$

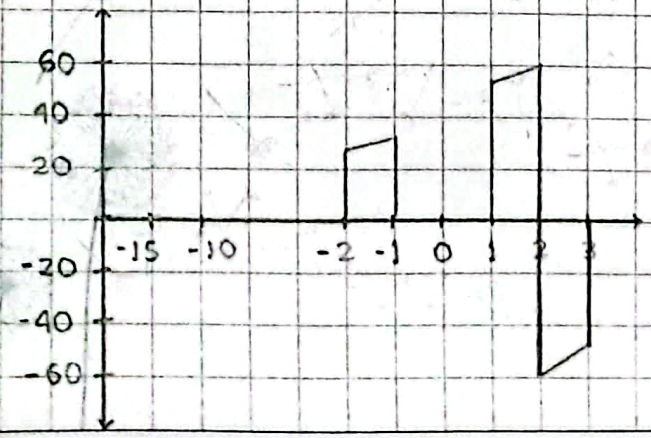
2) # cédula = 7 ⟶ $K = 2(7+1) = 16$

$w(t) = z(t) \cdot r(2(t+16) - 6$

$= z(t) \cdot r(2t + 26)$

↳ $2t + 26 = 0$

$t = -13$



t	z(t)	r(t)	w(t)
-15	0	0	0
-10	0	6	0
⋮ -2	1	22	22
-1	0	24	0
0	0	26	0
1	2	28	56
2	-2	30	-60
3	0	32	

3) K = 16

$$\text{sen}(\omega t + \phi) = \frac{1}{2j}\left(e^{j(\omega t+\phi)} - e^{-j(\omega t+\phi)}\right)$$

$$x(t) = \underbrace{4\,\text{sen}\left(4\pi t + \frac{\pi}{4}\right)}_{①} + \underbrace{16\cos(8\pi t)}_{②} + \underbrace{5}_{③}$$

- **Para ①:**

$$4\,\text{sen}\left(4\pi t + \frac{\pi}{4}\right) = \frac{4}{2j}\left(e^{j(4\pi t+\pi/4)} - e^{-j(4\pi t+\pi/4)}\right)$$

$\omega = 4\pi \rightarrow F = \frac{\omega}{2\pi} = 2\,Hz$ $\quad \phi = \frac{\pi}{4}$

$$x_1[n] = 2e^{j\pi/4}\delta[n-2] - 2e^{-j\pi/4}\delta[n+2]$$

- **Para ②:**

$\omega = 8\pi \rightarrow F = 4\,Hz$ $\quad \phi = 0$

Amplitud $= \frac{16}{2} = 8 \rightarrow$ en $f = 4\,Hz$ $\quad x_2[n] = 8\delta[n-4] + 8\delta[n+4]$

- **Para ③:** $5 \rightarrow$ cte

$$x_3[n] = 5\delta[n]$$

$$x[n] = 5\delta[n] + 2e^{j\pi/4}\delta[n-2] - 2e^{-j\pi/4}\delta[n+2] + 8\delta[n-4] + 8\delta[n+4]$$

4) $x(t) = \underbrace{4\,\text{sen}\left(40\pi t + \frac{\pi}{4}\right)}_{\omega = 40\pi,\ f_1 = 20\,Hz} + \underbrace{16\cos(8\pi t)}_{\omega = 80\pi,\ F_2 = 40\,Hz \rightarrow F_{max}} + 5$

Teorema Nyquist $\rightarrow F_s > 2 \cdot F_{max}$

$F_s > 80\,Hz$