PARCIAL FINAL

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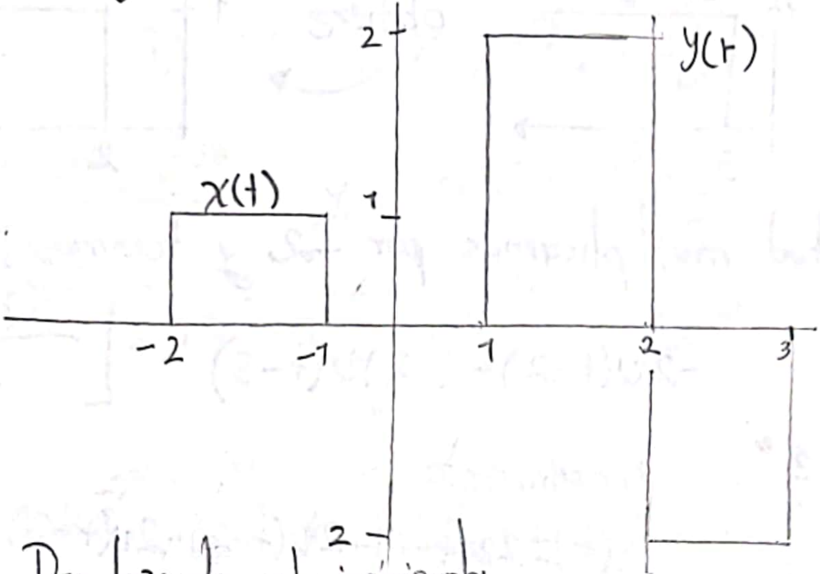
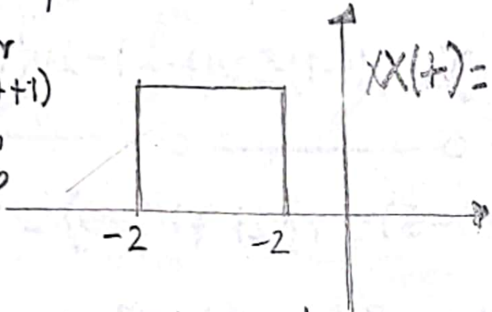
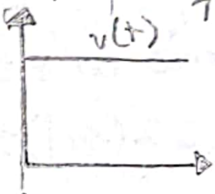


Para $x(t)$ Desplazando a la izquierda

Se deben restar las funciones $u(t+1)$ y $u(t+2)$ para tener el cuadro

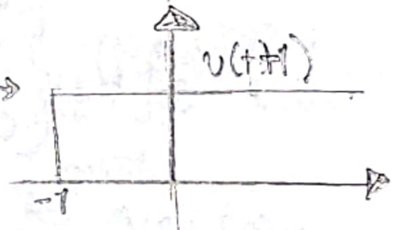


$xx(t) = u(t+2) - u(t+1)$ viene de que

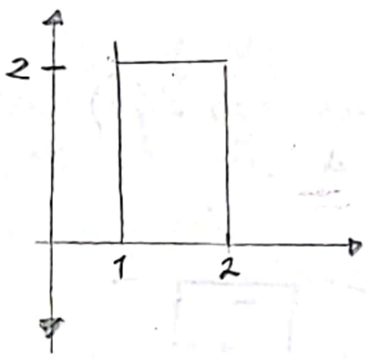


Al desplazar

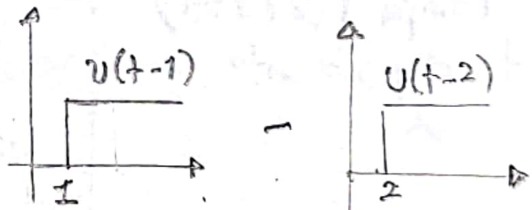
Desplazando se tiene

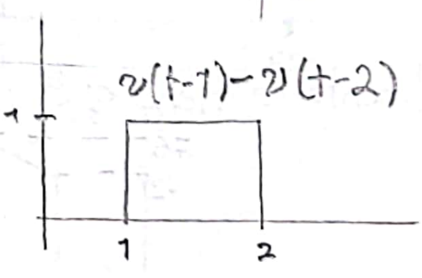


Para $y(t)$ Desplazando a la derecha

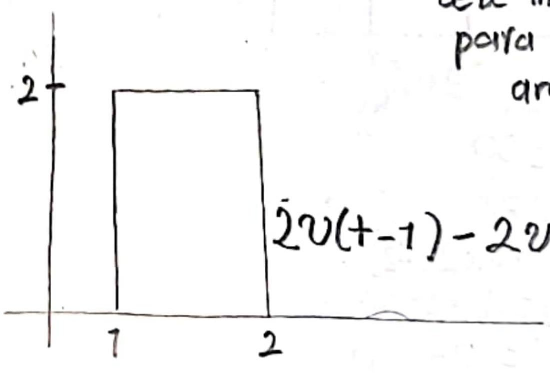


Se deben restar las funciones $u(t-1)$ y $u(t-2)$ así se obtiene lo siguiente

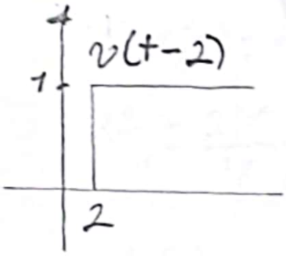




Posteriormente se debe multiplicar por 2 para aumentar la amplitud. y así obtener



$2u(t-1) - 2u(t-2)$ Ecuación primera parte finalmente para la última sección se deben restar $v(t-2)$ y $v(t-3)$



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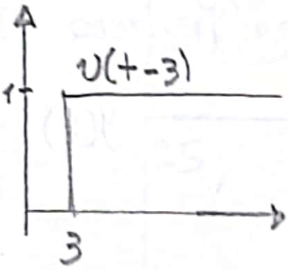
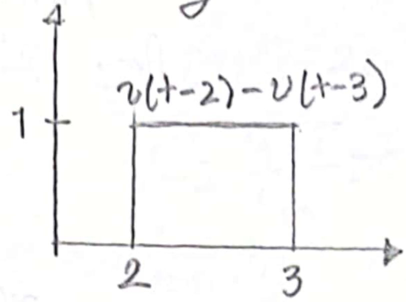
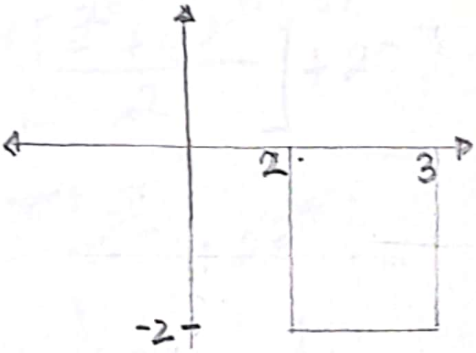


Así se obtiene



Para obtener la amplitud multiplicamos por -2 y tenemos



$$-2v(t-2)-(-2)v(t-3)$$

finalmente

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

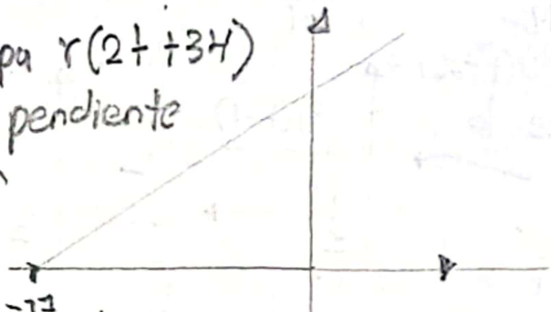
Así $z(t)=v(t+2)-v(t+1)+2v(t-1)-2v(t-2)-2v(t-2)+2v(t-3)$

2). Teniendo en cuenta que:

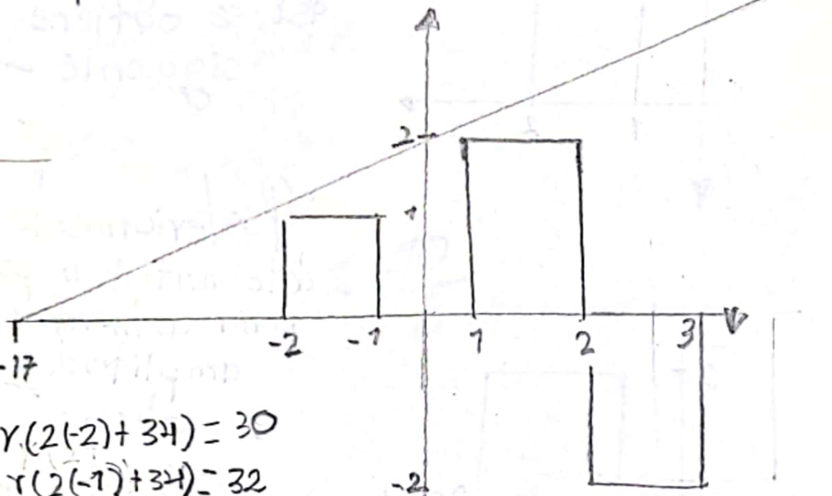
$k=2(9+1)=20$ y $r(2(t+k)-6)=r(2t+40-6)=r(2t+34)$

$$r(2t+34)\begin{cases} 2t+34 \rightarrow t>\frac{-34}{2}\rightarrow t>-17 \\ 0 \text{ en los demás} \end{cases}$$

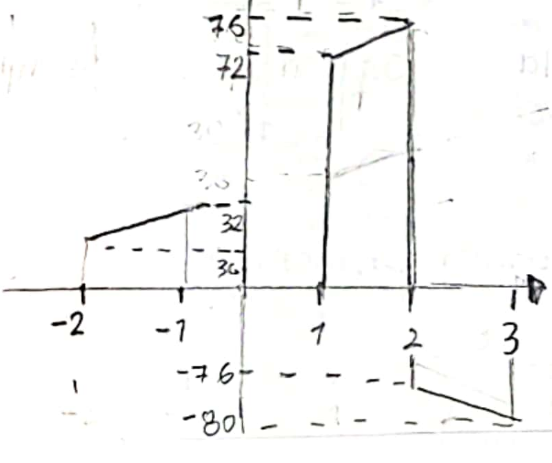
Rampa $r(2t+34)$ se tiene pendiente 2



Por ende al sumar con $z(t)$ tenemos



finalmente se tiene que



$r(2(-2)+34)=30$

$r(2(-1)+34)=32$

$r(2(1)+34)=36\times2=72$

$r(2(2)+34)=38\times2=76$

$r(2(3)+34)=40=-80$

3) Transformada de fourier de la señal

$$x(t) = 4 * \cos(8\pi t + \frac{\pi}{4}) + K \operatorname{sen}(4\pi t) + 5 \quad \text{con } K = 2[9+1] = 20$$

$$\omega_0 = \frac{2\pi}{T} \rightarrow T_1 = \frac{2\pi}{8\pi} = 0{,}25, \quad T_2 = \frac{2\pi}{4\pi} = 0{,}5, \quad \frac{T_1}{T_2} = \frac{0{,}25}{0{,}5} = 0{,}5 = \frac{1}{2}$$

Periódica

$$\cos(\theta) = \frac{e^{j\theta} + e^{-j\theta}}{2} \quad y \quad \operatorname{sen}(\theta) = \frac{e^{j\theta} - e^{-j\theta}}{2j}$$

$$\cancel{4}\left[\frac{e^{j(8\pi t + \frac{\pi}{4})} + e^{-j(8\pi t + \frac{\pi}{4})}}{\cancel{2}}\right] + 20\left[\frac{e^{j4\pi t} - e^{-j4\pi t}}{\cancel{2}j}\right] + 5e^{0}$$

$$2e^{j8\pi t} \cdot e^{j\frac{\pi}{4}} + 2e^{-j8\pi t} \cdot e^{-\frac{\pi}{4}} + \frac{10}{j} e^{j4\pi t} - \frac{10}{j} e^{-j4\pi t}$$

Teniendo en cuenta que

$$\sum_{k=-\infty}^{\infty} X[k] e^{j2\pi t k} = 2e^{-j8\pi t} \cdot e^{-\frac{\pi}{4}} - \frac{10}{j} e^{-j4\pi t} + 2e^{j8\pi t} \cdot e^{j\frac{\pi}{4}} + \frac{10}{j} e^{j4\pi t} + 5e^{0}$$

fase, Magnitud

Haciendo la sumatoria tenemos

$$\cdots + X[-4]e^{-j8\pi t} + X[-3]e^{-j6\pi t} + X[-2]e^{-j4\pi t} + X[-1]e^{-j2\pi t} + X[0]e^{0} +$$

$$X[1]e^{j2\pi t} + X[2]e^{j4\pi t} + X[3]e^{j6\pi t} + X[4]e^{j8\pi t}$$

Igualando los $X[t]$ coincidentes con los Euler

$$X[-4]e^{-j8\pi t} = 2e^{-j8\pi t} \cdot e^{-\frac{\pi}{4}} \rightarrow X[-4] = 2e^{-\frac{\pi}{4}}$$

$$X[-2]e^{-j4\pi t} = \frac{-10}{j} e^{-j4\pi t} \rightarrow X[-2] = 10j = \frac{-10}{j}$$

$$X[2]e^{j4\pi t} = \frac{10}{j} e^{j4\pi t} \rightarrow X[2] = \frac{10}{j}$$

$$X[4]e^{j8\pi t} = 2e^{j8\pi t} \cdot e^{j\frac{\pi}{4}} \rightarrow X[4] = 2e^{j\frac{\pi}{4}}$$

$$X[0]e^{0} = 5e^{0} \rightarrow X[0] = 5$$

5 Armónicos $\neq 0$