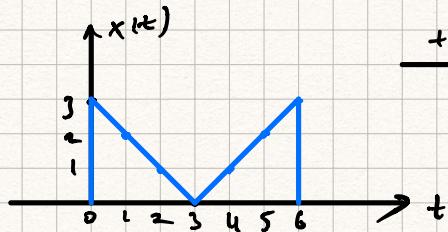


EHB 206- Uygulama 1

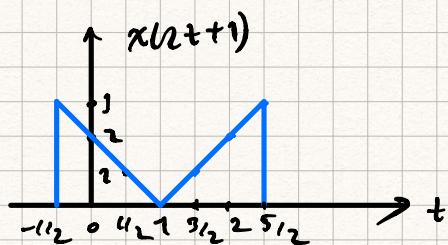
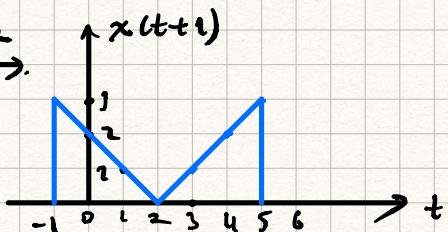
İbrahim Yıldırım

① $x(t) = \begin{cases} |t-3|, & 0 \leq t \leq 6 \\ 0, & \text{diger} \end{cases}$ işaretini çiziniz.

- $x(2t+1)$ işaretini çiziniz.



+1 "steleme"



Kontrol et:

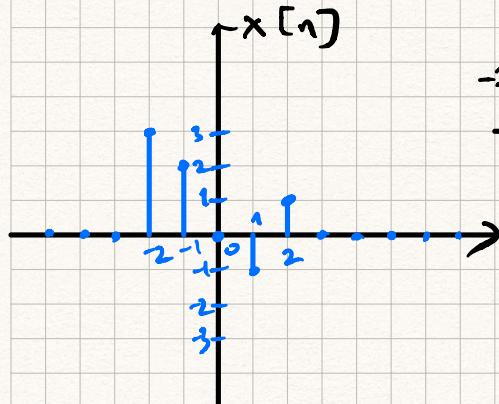
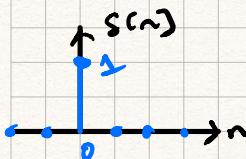
$$t=0 \rightarrow x(1)=2 \quad \checkmark$$

$$t=1 \rightarrow x(3)=0 \quad \checkmark$$

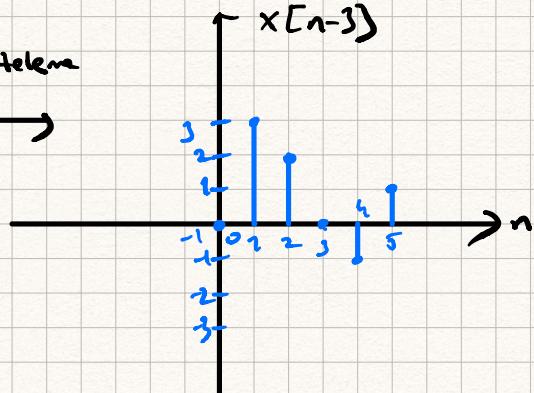
$$t=2 \rightarrow x(5)=2 \quad \checkmark$$

② $x[n] = \{3, 2, 0, -1, 1\}$ işaretini çiziniz ve $\delta[n]$ cinsinden ifade ediniz.

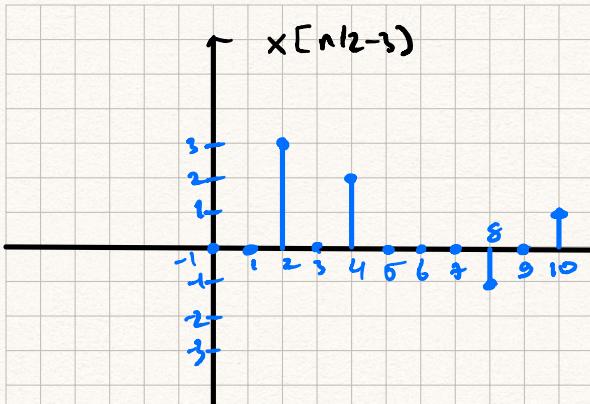
- $x[n-2-3]$ işaretini işaretle gösteriniz.



-3 birim steleme



$$x[n] = 3 \cdot s[n+2] + 2 \cdot s[n+1] - 1 \cdot s[n-1] + s[n-2]$$



$$x[n|n-3] = 3s[n-2] + 2s[n-4] - 1 \cdot s[n-8] + s[n-10]$$

③ $x(t) = \cos\left(\frac{\pi}{3}t - \frac{\pi}{8}\right) + \sin\left(\frac{\pi}{4}t + 1\right)$

$x(t)$ işaretinin periyodik midir? Tercih periyodunu bulunuz.

$$\omega_1 = 2\pi f_1 = \frac{\pi}{3}$$

$$f_1 = 1/6$$

$$T_1 = 6$$

$$\omega_2 = 2\pi f_2 = \frac{\pi}{4}$$

$$f_2 = 1/8$$

$$T_2 = 8$$

$$\text{OK EK}(6,8) = 24$$

$x(t)$ işaretinin 24'le kemerle periyodikdir!

④ $x[n] = \cos\left(\frac{\pi}{3}n - \frac{\pi}{8}\right) + \sin\left(\frac{1}{4}n\right)$

Periyodik midir?

$$\omega_1 = 2\pi f_1 = \pi/3$$

$$\frac{\pi/3}{2\pi} = \frac{m}{N_1}$$

$$\frac{1}{6} = \frac{m}{N_1}$$

$$N_1 = 6m \rightarrow m=1$$

$$N_1 = 6$$

$$\omega_2 = 2\pi f_2 = \frac{1}{4}$$

$$\frac{1/4}{2\pi} = \frac{m}{N_2}$$

$$N_2 = \frac{8\pi}{1} \cdot m$$

tamsayı olamaz!

$\frac{\omega_2}{2\pi} = \frac{m}{N}$ rasyonel sayı
 $m:$ positive integer

$x[n]$ Periyodik değil!

$$⑤ x[n] = e^{j\frac{\pi}{5}n} + e^{j\frac{\pi}{2}n}$$

$$\omega_1 = \frac{\pi}{5}$$

$$\omega_2 = \frac{\pi}{2}$$

$$\frac{\pi/5}{2\pi} = \frac{m}{N_1}$$

$$\frac{\pi/2}{2\pi} = \frac{m}{N_2}$$

$$N_1 = 10m \\ = 10$$

$$N_2 = 4m \\ = 4$$

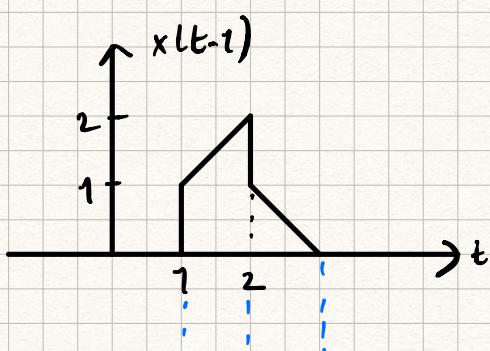
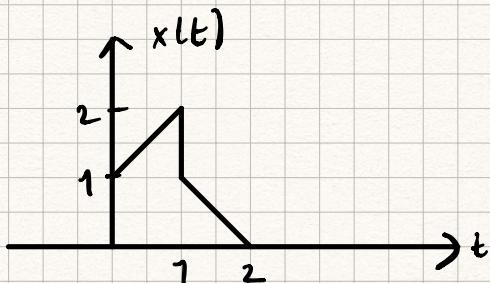
$$\left. \begin{array}{l} \text{OKEIK}(10,4) = 20 \\ \text{periode!} \end{array} \right\}$$

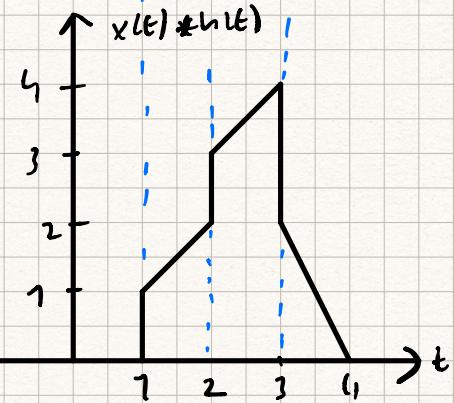
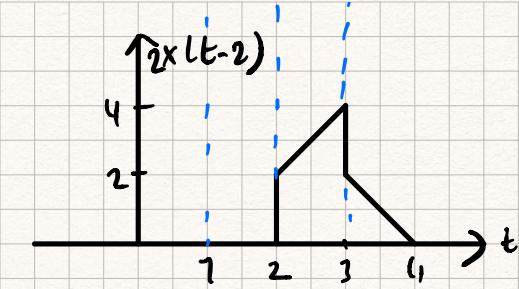
⑥ Konvolusyon özelliklerinden yararlanarak $x(t) * h(t)$ 'yi bulunuy.

$$x(t) = \begin{cases} t+1, & 0 \leq t < 1 \\ 2-t, & 1 < t \leq 2 \\ 0, & \text{diger} \end{cases}, \quad h(t) = \delta(t-1) + 2\delta(t-2)$$

$$x(t) * \delta(t-k) = x(t-k)$$

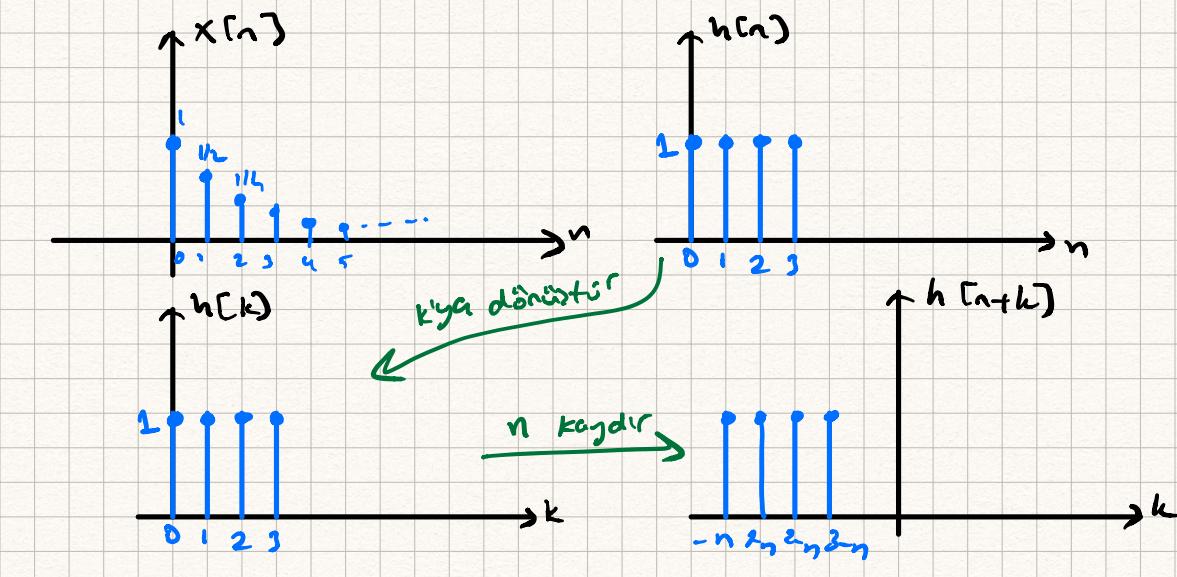
$$x(t) * h(t) = x(t) * [\delta(t-1) + 2\delta(t-2)] \\ = x(t-1) + 2x(t-2)$$

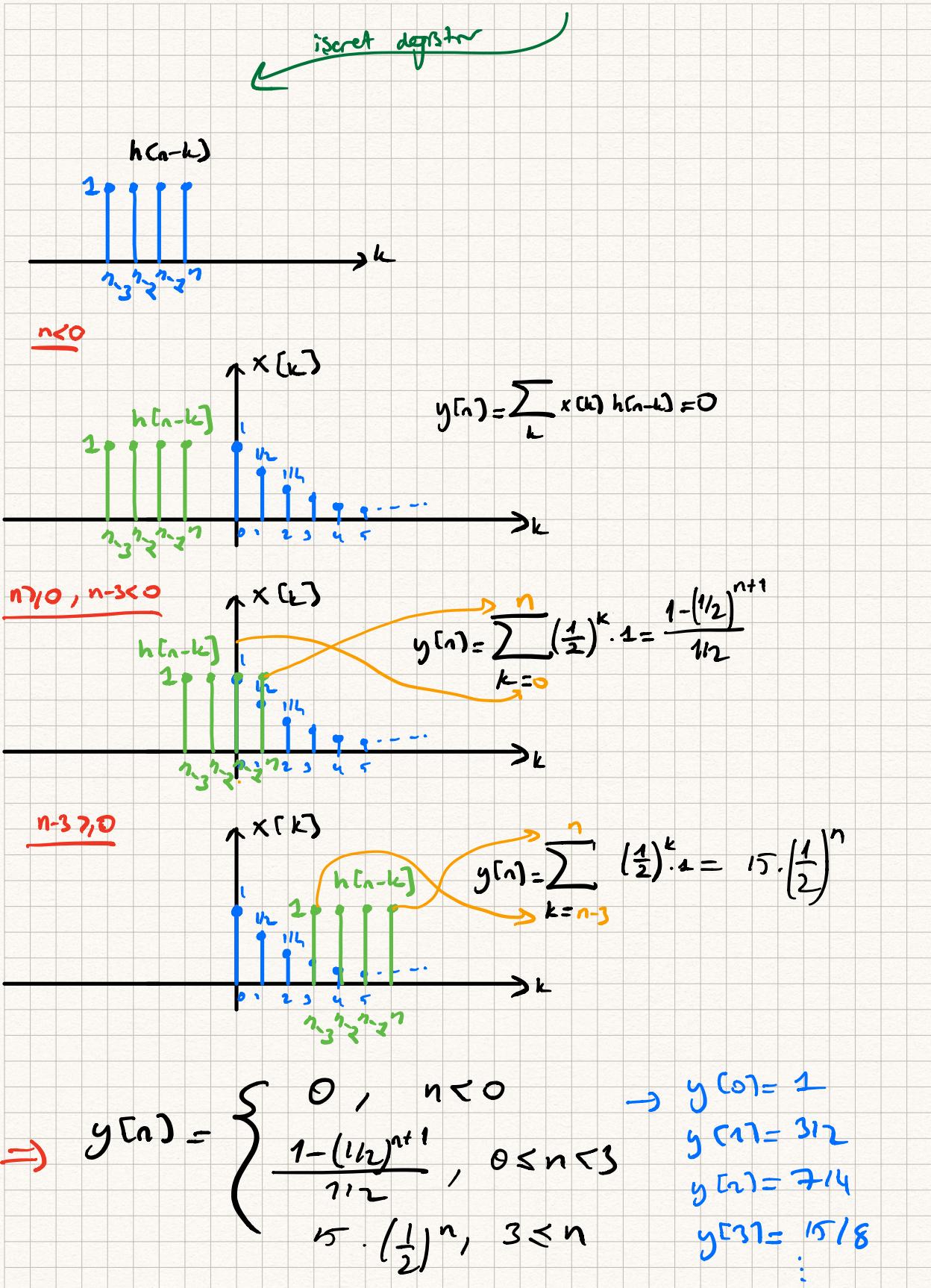




$$\textcircled{3} \quad \left. \begin{array}{l} x[n] = \left(\frac{1}{2}\right)^n u[n] \\ h[n] = u[n] - u[n-4] \end{array} \right\} y[n] = x[n] * h[n] = ?$$

$$y[n] = x[n] * h[n] = \sum_{k=-\infty}^{\infty} x[n-k] h[n-k] = \sum_{k=-\infty}^{\infty} x[n-k] h[k]$$





Diger yolu:

$$x[n] * \delta[n-n_0] = x[n-n_0]$$

$$h[n] = u[n] - u[n-4] = \delta[n] + \delta[n-1] + \delta[n-2] + \delta[n-3]$$

$$y[n] = x[n] * h[n] = x[n] * [\delta[n] + \delta[n-1] + \delta[n-2] + \delta[n-3]]$$

$$= x[n] * \delta[n] + x[n] * \delta[n-1] + x[n] * \delta[n-2] + x[n] * \delta[n-3]$$

$$= \left(\frac{1}{2}\right)^n \cdot u[n] + \left(\frac{1}{2}\right)^{n-1} \cdot u[n-1] + \left(\frac{1}{2}\right)^{n-2} u[n-2] + \left(\frac{1}{2}\right)^{n-3} u[n-3]$$

$$\rightarrow y[0] = 1$$

$$y[1] = \frac{1}{2} + 1 = \frac{3}{2}$$

$$y[2] = \frac{1}{4} + \frac{1}{2} + 1 = \frac{7}{4}$$

$$y[3] = \frac{1}{8} + \frac{1}{4} + \frac{1}{2} + 1 = \frac{15}{8}$$

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