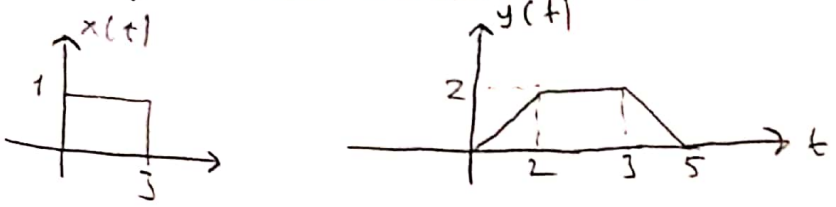
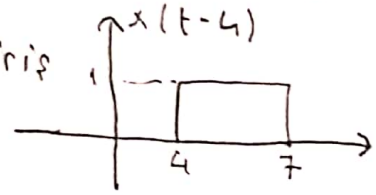
Halil Gök
386005

Soru 1) soruda verilen grafik

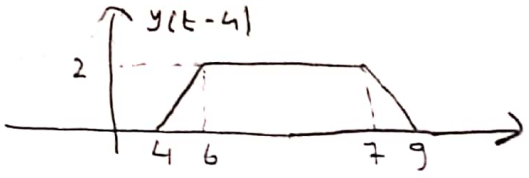


1) Sisteme $x(t-4)$ yani zamanda 4 birim sağa kaydırırsak şöyle grafik elde ederiz.

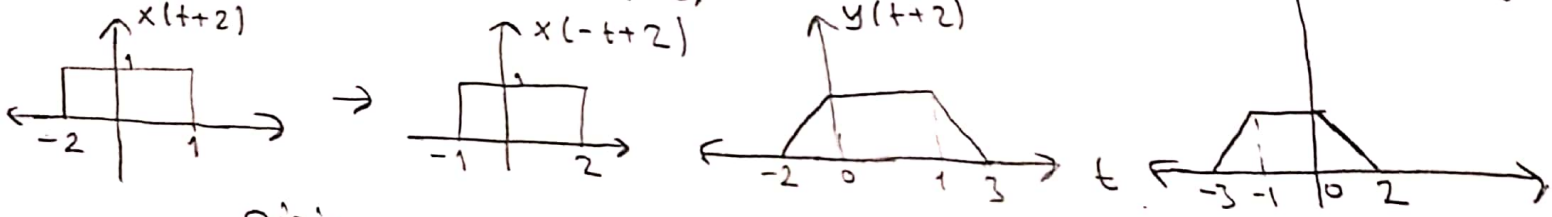
giriş



çıkış



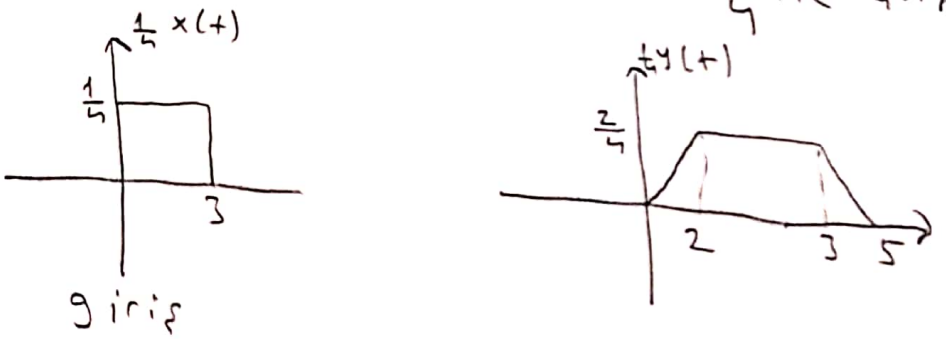
2) Sisteme $x(-t+2)$ uygularsak yani önce +2 birim sola sonra simetrisini alacağız.



giriş

çıkış

3) Sistem $\frac{1}{4}x(t)$ yani $\frac{1}{4}$ ile çarpacağız.



giriş

Soru 2)

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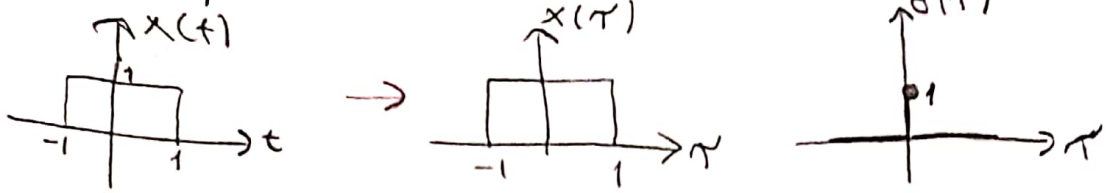
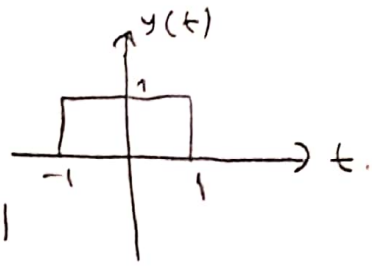


a) $y(t) = x(t) * \delta(t) = ?$

*Özellik $\boxed{x(t) * \delta(t) = x(t) = y(t)}$

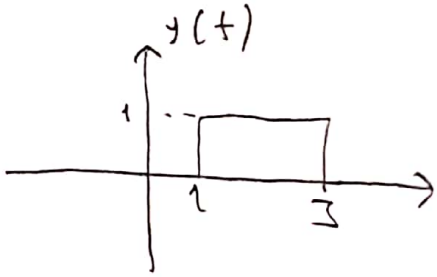
x(t) fonksiyonu ile dirac delta konvolüsyonu sonucu x(t) fonksiyonuna eşittir.



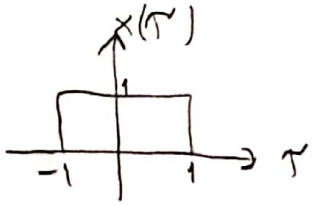
b) $x(t) * \delta(t-2) = ?$

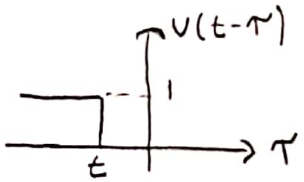
*özellik $x(t) * \delta(t-t_0) = x(t-t_0)$

$\boxed{x(t) * \delta(t-2) = x(t-2) = y(t)}$



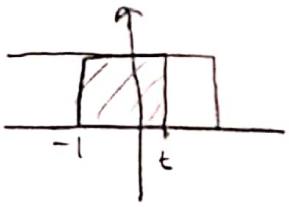
c)





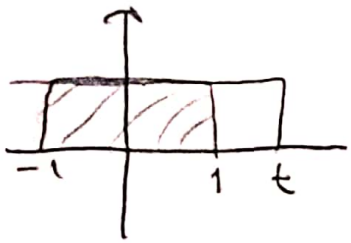
$t < -1$ için çakışma olmaz. $y(t) = 0$ //

$-1 < t < 1$ için $\boxed{y(t) = \int_{t_1}^{t_2} x(\tau) \cdot h(t-\tau)\, d\tau}$



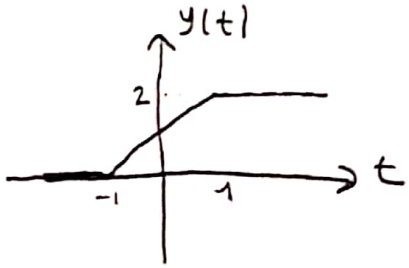
$$y(t) = \int_{-1}^{t} 1 \cdot 1\, d\tau = \tau \Big|_{-1}^{t} = t+1$$ //

$t > 1$ için



$$y(t) = \int_{-1}^{1} 1 \cdot 1\, d\tau = \tau \Big|_{-1}^{1} = 1+1 = 2$$ //

$$y(t) = \begin{cases} 0, & t < -1 \\ t+1, & -1 < t < 1 \\ 2, & t > 1 \end{cases}$$



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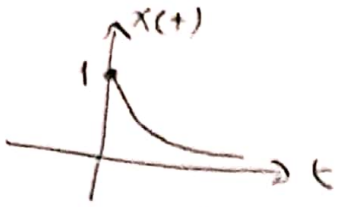
SORU 4.

a) $x(t) = e^{-t}u(t)$



$P = \frac{1}{t_2-t_1}\int_{t_1}^{t_2}|x(t)|^2$

$= \frac{1}{0-\infty}\cdot\frac{1}{2}$

$P_\infty = 0 \cdot \frac{1}{2} = 0$

Enerji işaretidir.

$E = \int_{-\infty}^{\infty}|x(t)|^2 dt$ — u(t) fonksiyonu 2. bölgede 0 dır.

$E_\infty = \int_{-\infty}^{0} e^{-2t}\cdot u(t)^2\,dt + \int_{0}^{\infty} e^{2t}\,dt$

$= \frac{e^{-2t}}{-2}\Big|_0^\infty = \frac{1}{2} = E_\infty$

$P_\infty = 0$

b) $x(t) = \begin{cases} 5 & -2 \le t \le 2 \\ 0 & \text{diğer} \end{cases}$

$E_T = \int_{t_1}^{t_2}|x(t)|^2 dt = \int_{-2}^{2} 5^2 dt = 25t\Big|_{-2}^{2} = 100$

$P_{ort} = \frac{1}{t_2-t_1}\cdot\int_{t_1}^{t_2}|x(t)|^2 dt = \frac{1}{2-(-2)}\cdot 100 = 25$

x(t) işareti enerji veya güç değildir.

Soru 5.

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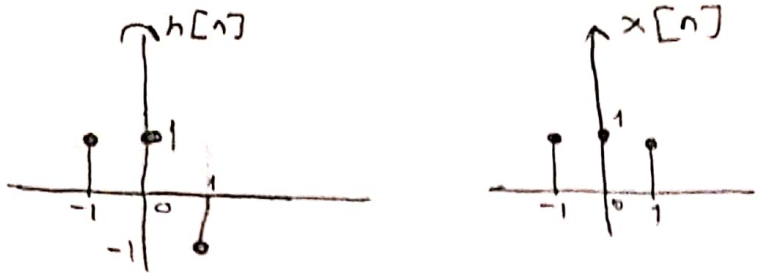
Fonksiyonlarımız şu şekilde



Konvolasyon toplamımız ayrık zamandır.

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

fonksiyondaki noktalar haricindeki noktalar dışında konvolusyon sıfırdır. Noktaları ele alacağız.

$$y[1] = \sum_{k=-1}^{k=1} x[k]\cdot h[1-k]$$

(bilinen değerleri koyalım)

$$= x[-1]\cdot h[2] + x[0]\cdot h[1] + x[1]\cdot h[0]$$

$$= 1\cdot 0 + 1\cdot(-1) + 1\cdot 1 = 0 \text{ //}$$

$$y[0] = \sum_{k=-1}^{k=1} x[k]\cdot h[0-k]$$ (benzer işlem)

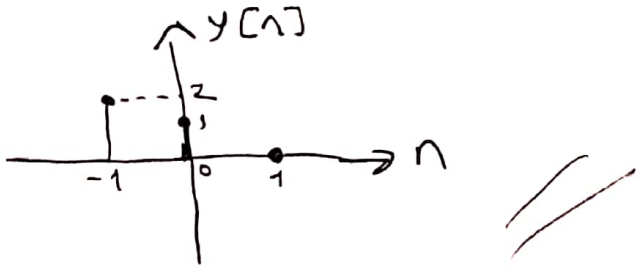
$$= x[-1]\cdot h[1] + x[0]\cdot h[0] + x[1]\cdot h[-1]$$

$$= 1\cdot(-1) + 1\cdot 1 + 1\cdot 1 = 1 \text{ //}$$

$$y[-1] = \sum_{k=-1}^{k=1} x[k]\cdot h[-1-k]$$

$$= x[-1]\cdot h[0] + x[0]\cdot h[-1] + x[1]\cdot h[-2]$$

$$= 1\cdot 1 + 1\cdot 1 + 1\cdot 0 = 2 \text{ //}$$



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SORU 3

$$\delta(t) = \frac{dx(t)}{dt} \quad \text{özelliği vardır.}$$

b) $\underbrace{(3t^2+2t+1)}_{x(t)}\,\delta(t) = (3t^2+2t+1)\frac{d}{dt}$

b) $\Rightarrow \quad = 6t+2$

$$\boxed{(3t^2+2t+1)\,\delta(t) = 6t+2}$$

---

a) $\int_{-2}^{3} (3t^2+2t+1)\,\frac{d}{dt}\cdot dt$

$= \int_{-2}^{3} (3t^2+2t+1)\,dt$

$= t^3+t^2+t\,\Big|_{-2}^{3} = \underbrace{(27+9+3)}_{39} - (-8+4-2)$

$+\ 6$

$= 45$ //