

TSK821 Facit Lektion 3. 1(5)

1.5 i) Ja, $T_0 = \frac{2\pi}{5\pi/8} = \frac{16}{5}$ s

ii) Ja, $T_0 = \frac{8}{5}$ s

iii) Nej

iv) Ja, $T_0 = \frac{2\pi}{5}$ s

v) Nej

vi) Nej

vii) Ja, $T_0 = \frac{\pi}{5}$ s

1.17a) Varten jämn eller udda
Ickeperiodiskt
Energisignal $E = 25$

$$x_e(t) = \frac{1}{2}(x(t) + x(-t)) = \begin{cases} 2.5, & |t| < 1 \\ 0, & \text{f.ö.} \end{cases}$$

$$x_o(t) = \frac{1}{2}(x(t) - x(-t)) = \begin{cases} 2.5, & -1 < t < -1/2, 0 < t < 1/2 \\ -2.5, & -1/2 < t < 0, 1/2 < t < 1 \\ 0, & \text{f.ö.} \end{cases}$$

b) Udda, periodiskt
Effekt signal, $P = \frac{25}{4}$

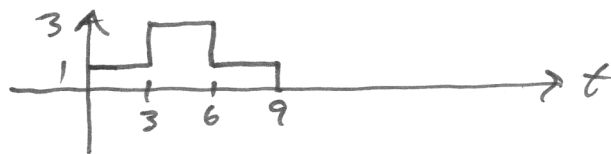
1.17c) Varken udda eller jämn.
 Ikke-periodisk.
 Energisignal.

$$x_e(t) = \frac{1}{2}e^{-1.5|t|}, \quad x_o(t) = \frac{1}{2}\text{sgn}(t)e^{-1.5|t|}$$

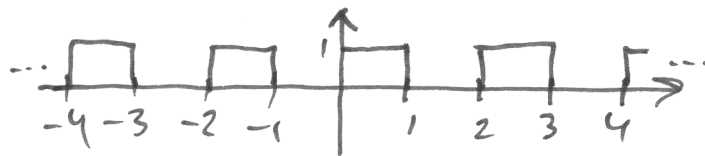
$$E = \frac{1}{3}$$

d) Udda, periodisk, effektsignal
 $T_0 = 3$, $P = \frac{25}{36}$

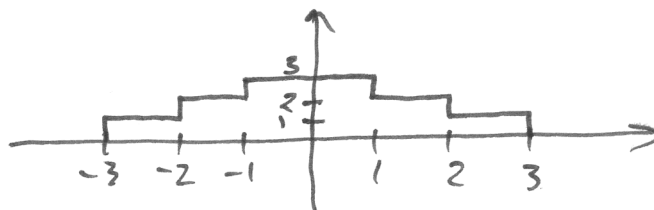
1.18 i)



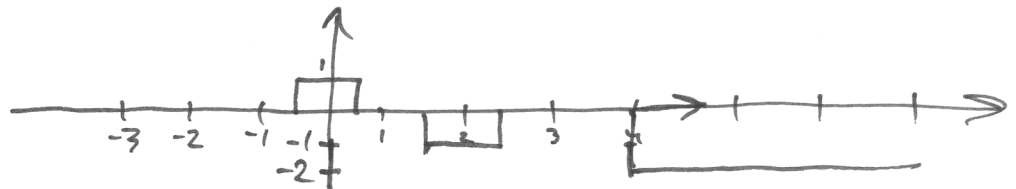
ii)



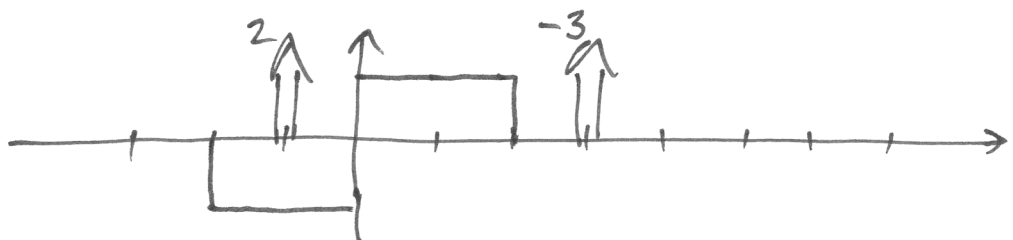
iii)



iv)



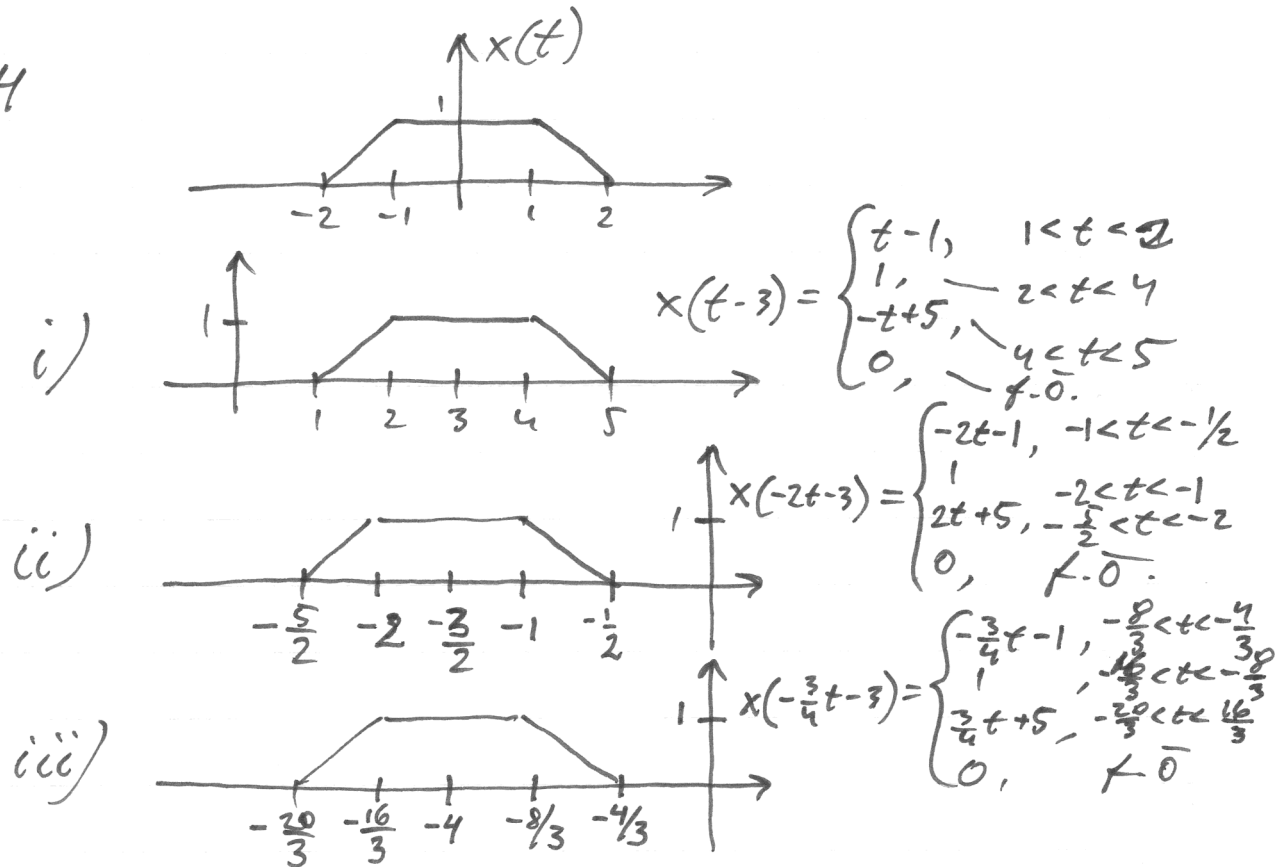
v)




1.21 i) $\frac{8}{9} \delta(t)$ ii) $\frac{1}{2} \delta(t)$ iii) $\frac{124}{27} \delta(\omega-5)$

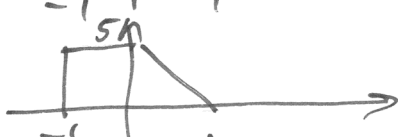
1.22 i) 4 ii) 4 iii) 0

1.24

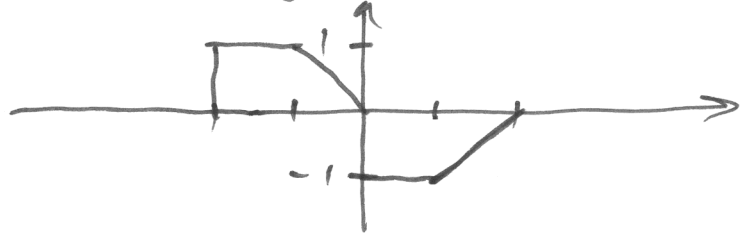


- 2.9 i) Linyär, TI, stabil, kausal
 ii) Linyär, icke-TI, stabil, icke-kausal
 iii) Icke-linyär, icke-TI, stabil, icke-kausal.
 iv) Linyär, icke-TI, icke-stabil, icke-kausal
 v) icke-linyär, icke-TI, stabil, kausal
 vi) Linyär, icke-TI, stabil, kausal
 vii) icke-linyär, TI, stabil, kausal
 viii) icke-linyär, TI, stabil, kausal.

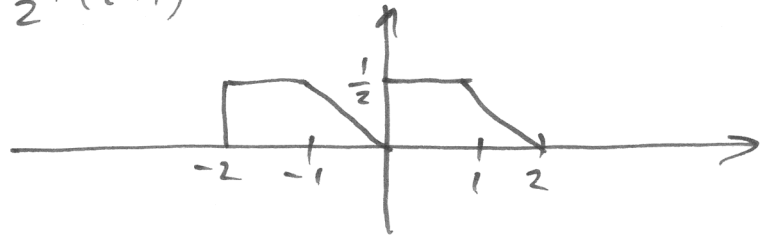
2.11 $x(t) \Rightarrow y(t)$  LTI.

i) $5x(t) \Rightarrow 5y(t)$ 

ii) $x(t+1) - x(t-1) \Rightarrow y(t+1) - y(t-1)$



iii) $\frac{1}{2}x(t-1) + \frac{1}{2}x(t+1)$

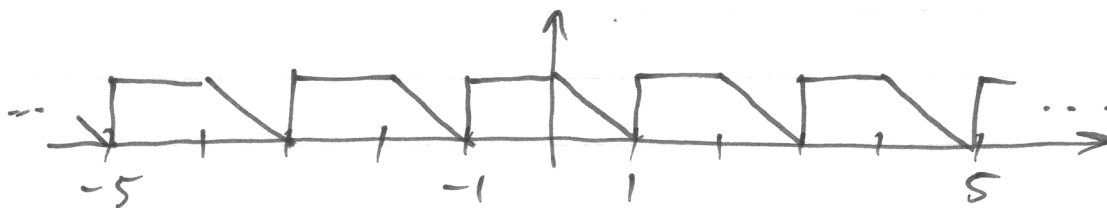


iv) Not $\frac{d}{dt}x(t) \Rightarrow \frac{d}{dt}y(t)$

$\frac{d}{dt}x(t) + 3x(t) \Rightarrow \frac{d}{dt}y(t) + 3y(t)$



2.16



$$2.17 \text{ i) } h(t) = \delta(t+2) - 2\delta(t) + 2\delta(t-2)$$

$$\text{ii) } h(t) = \text{rect}\left(\frac{t-4}{2t_0}\right) = \begin{cases} 1, & 4-t_0 < t < 4+t_0 \\ 0, & \text{f.ö} \end{cases}$$

$$\text{iii) } h(t) = e^{-2(t-4)} u(t-4)$$

$$\text{iv) } h(t) = f(T-t)$$

$$3.4 \text{ i) } y(t) = \frac{e^{-\alpha t} - e^{-\beta t}}{\beta - \alpha} u(t)$$

$$\text{ii) } y(t) = t \cdot e^{-\alpha t} u(t)$$

$$\text{iii) } -$$

$$3.5 \text{ i) } y(t) = t \cdot u(t)$$

$$\text{ii) } y(t) = -t u(-t)$$

$$\text{iii) } y(t) = \begin{cases} t+1, & -1 < t < 0 \\ 1-t, & 0 < t < 2 \\ t-3, & 2 < t < 3 \\ 0, & \text{f.ö.} \end{cases}$$

3.9 $h(t)$ för vara fullständig i intervallet $[-3, 3]$