

6.1. PREDAVANJE

2011

25/7

$$y(nT) = a_1 y(nT - T) + a_2 y(nT - 2T) + b x(nT)$$

$$Y(z) = a_1 Y(z) \cdot z^{-1} + a_2 Y(z) \cdot z^{-2} + b \cdot X(z)$$

$$Y(z) - a_1 Y(z) \cdot z^{-1} - a_2 Y(z) \cdot z^{-2} = b \cdot X(z)$$

$$Y(z) \cdot (1 - a_1 z^{-1} - a_2 z^{-2}) = b \cdot X(z)$$

$$H(z) = \frac{Y(z)}{X(z)} = \frac{b}{1 - a_1 z^{-1} - a_2 z^{-2}}$$

$$x(n) = u(n)$$

$$X(z) = U(z) = \frac{1}{z-1}$$

$$Y(z) = H(z) \cdot X(z) = \frac{b}{(1 - a_1 z^{-1} - a_2 z^{-2})} \cdot \frac{1}{z-1}$$

26/12

$$x_a(t) = A \cos(2\pi F_k t + \varphi) \quad F_k = F_0 + k \cdot F_s \quad T = \frac{1}{F_s}$$

$$x(nT) = A \cos\left(2\pi \frac{F_0 + k F_s}{F_s} nT + \varphi\right)$$

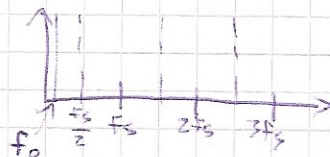
$$\begin{aligned} x(nT) &= A \cos\left(2\pi (F_0 + k F_s) nT + \varphi\right) = A \cos\left(2\pi F_0 nT + 2\pi k F_s nT + \varphi\right) = \\ &= A \cos\left(2\pi n \frac{F_0}{F_s} + 2\pi n k \frac{F_0}{F_s} + \varphi\right) = A \cos\left(2\pi n \frac{F_0}{F_s} + \varphi\right) \end{aligned}$$

$$a) \quad k=0 \quad F_k = F_0$$

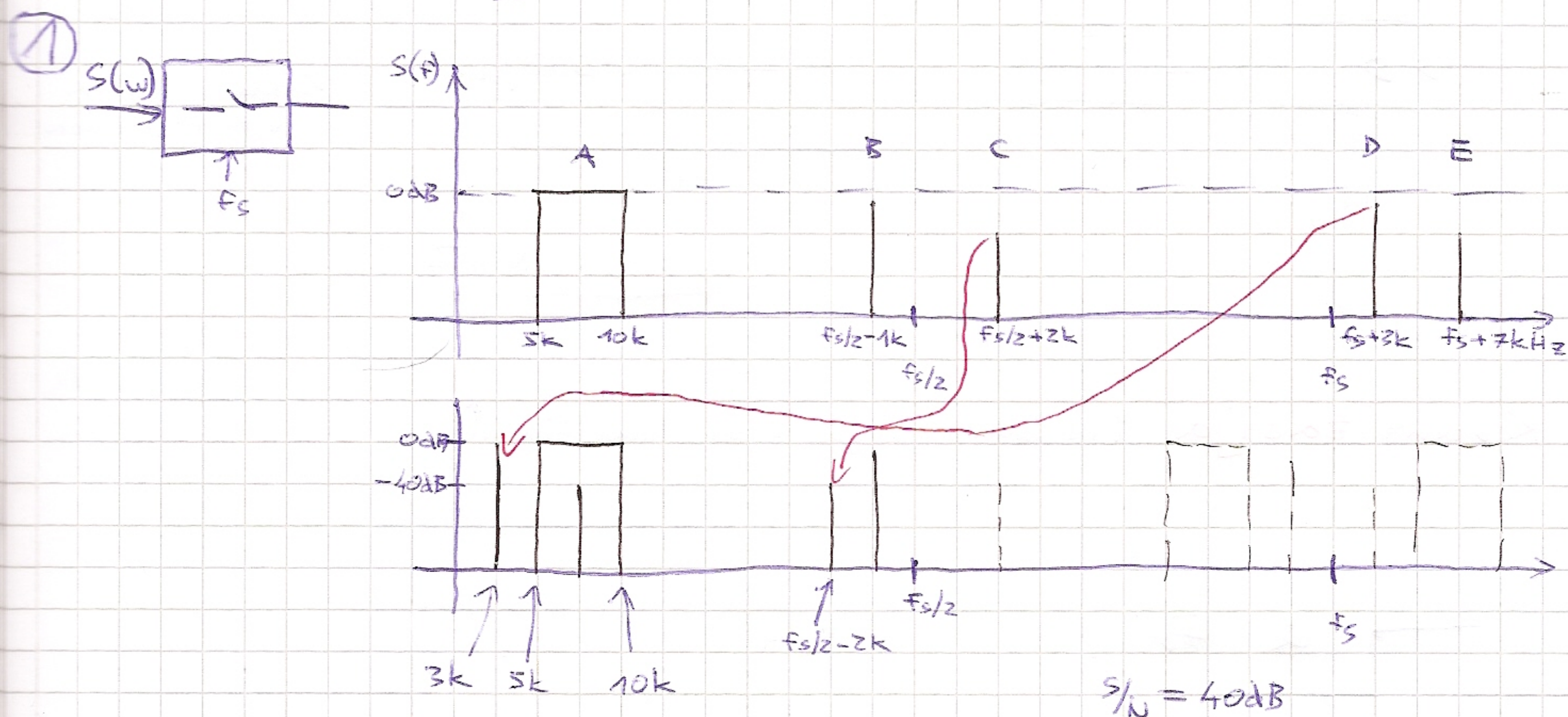
$$x(nT) = A \cos\left(2\pi n \frac{F_0}{F_s} + \varphi\right)$$

$$k=1 \quad F_k = F_0 + F_s$$

$$x(nT) = A \cos\left(2\pi n \frac{F_0}{F_s} + \varphi\right)$$



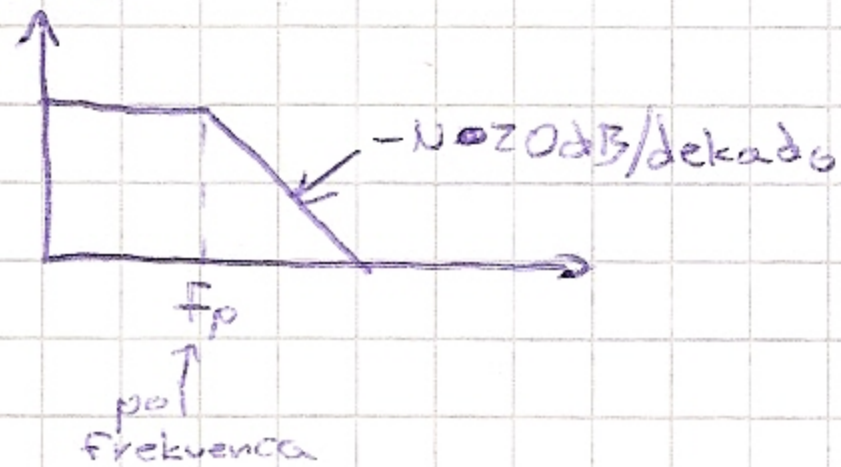
Primer: Antialiasing Filter



AAF



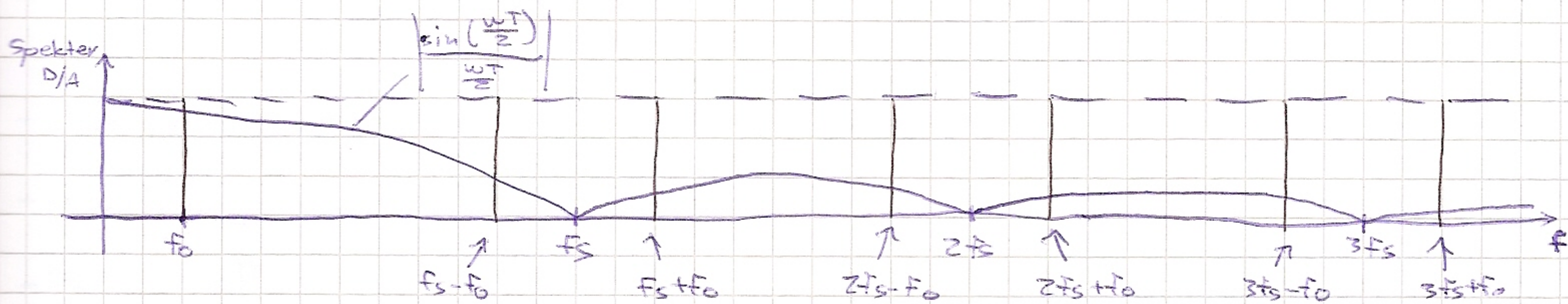
Def. filter:



gladilni filter



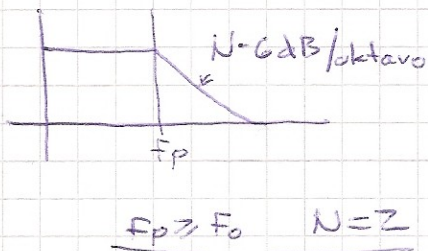
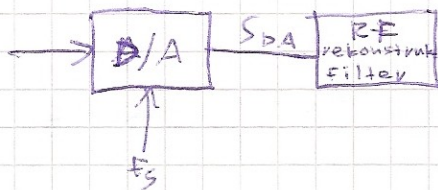
$$H_{S/H} = \frac{\sin\left(\frac{\omega T}{2}\right)}{\frac{\omega T}{2}}$$



$$H_{S/H}(f_0) = \left| \frac{\sin\left(\frac{2\pi f_0}{2f_s}\right)}{\left(\frac{\pi f_0}{f_s}\right)} \right| = 0,98363$$

$$H_{S/H}(f_s - f_0) = \left| \frac{\sin\left(\frac{2\pi(f_s - f_0)}{2f_s}\right)}{\left(\frac{\pi(f_s - f_0)}{f_s}\right)} \right| = 0,1093$$

b)

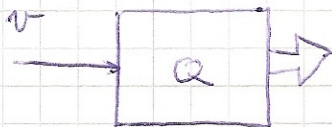


oktavi: 2, 4, 8, 16...

1 oktava je 2x
višja frekvenca

Kvantizacija (iz analognega v digitalni signal)

N - napetost



Izpit

Vsako ZO vprašanj (strle, Zajc)

-kratka, nekatera računska, druga teoretična

13.1. AVDITORNE 2011.

① CMOS

$$Z = \overline{A} + BC$$

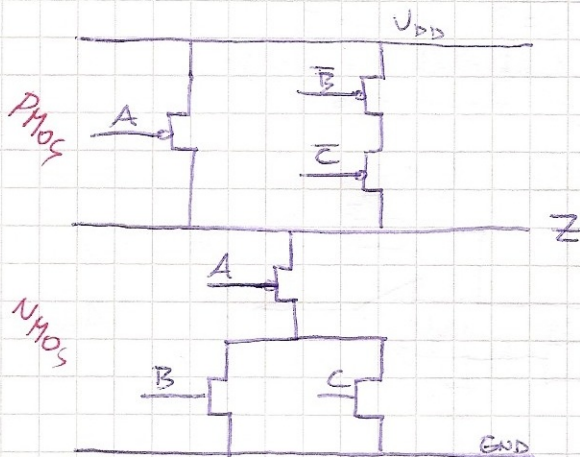
$$\overline{Z} = \overline{\overline{A} + BC} = A \cdot \overline{BC}$$

$$\overline{Z} = A \cdot (\overline{B} + \overline{C})$$

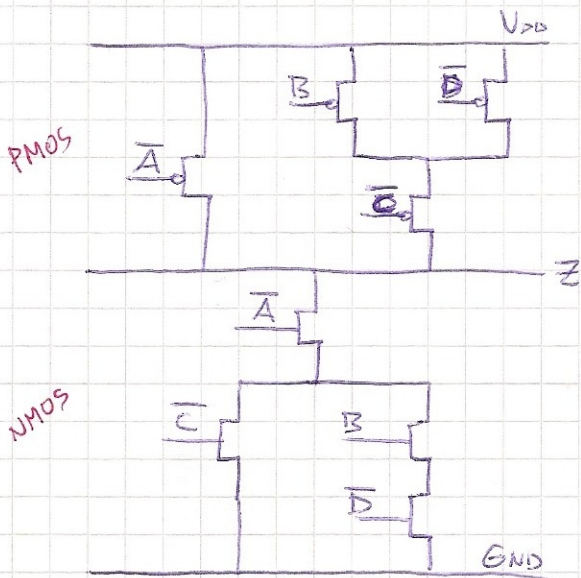
$$Z = \overline{A \cdot (\overline{B} + \overline{C})}$$

$$Z = 0 \quad (A=0, B=0, C=1)$$

$$Z = 1$$



② CMOS



$$\left(Z = \overline{A} \cdot (\overline{B} + \overline{D}) \cdot C \right)$$

$$Z = A + (\overline{C} + B \cdot \overline{D}) = A + C \cdot (\overline{B} \cdot \overline{D})$$

$$Z = \overline{A} \cdot (\overline{C} + B \cdot \overline{D})$$

$$Z = 1$$

kakšni so vhodi Z

$$\underline{A=1}$$

$$B =$$

$$C =$$

$$D =$$

poljubni

$$\underline{A=0}$$

$$C=1$$

$$B=0$$

$$D=0 \text{ di } 1$$

2

$$126_{(10)} = \underline{1111110}_{(2)} \quad (2)$$

$$73_{(10)} = \underline{1001001}_{(2)} \quad (10)$$

$$10101010_{(2)} = \underline{170}_{(10)} \quad (10)$$

$$89_{(10)} = \underline{1011001}_{(2)} \quad (2)$$

$$102_{(10)} = \underline{1100110}_{(2)} \quad (10)$$

$$110100_{(2)} = \underline{34}_{(10)} \quad (10)$$

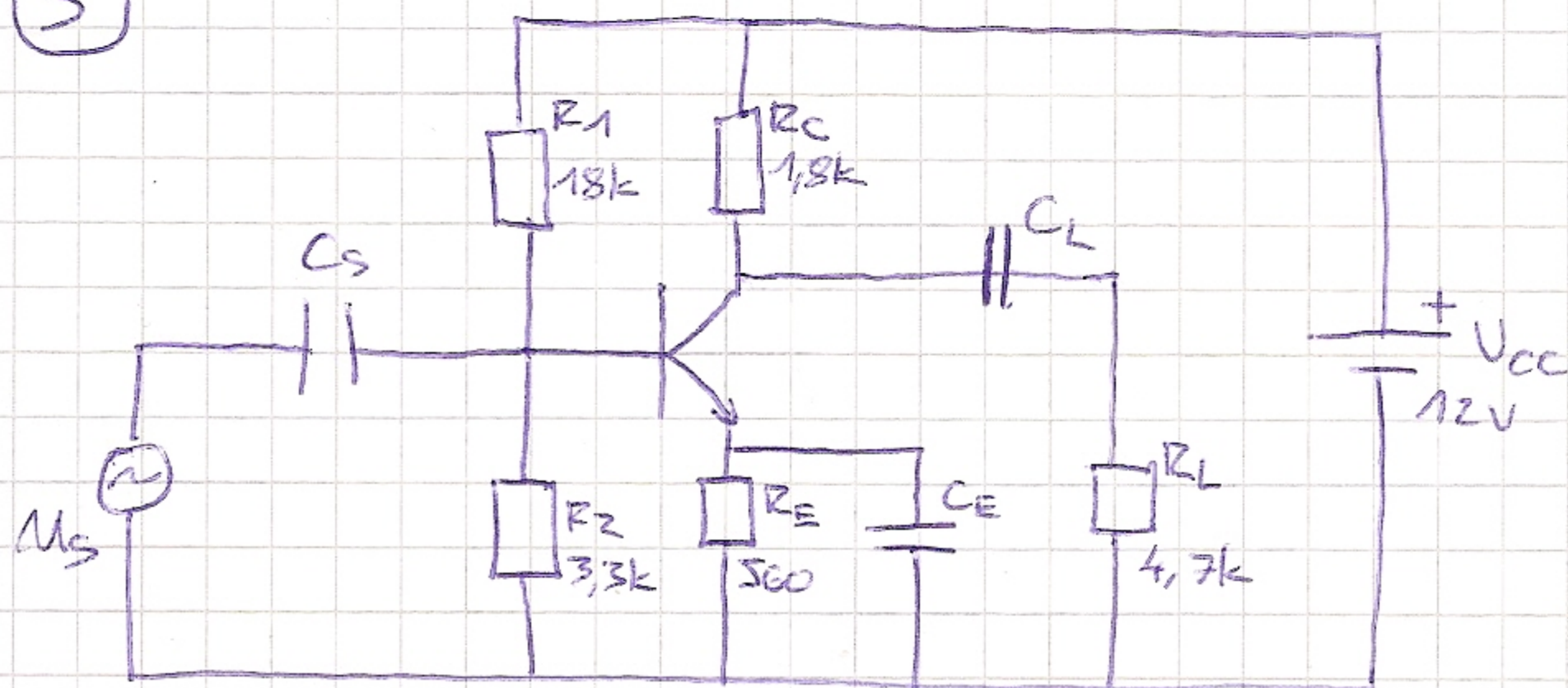
$$111_{(10)} = \underline{1101111}_{(2)} \quad (2)$$

126		2
63		0
31		1
15		1
7		1
3		1
1		1
0		1 ↑

89		2
44		1
22		0
11		0
5		1
2		1
1		0
0		1 ↑

102		16
6		6
0		6 ↑

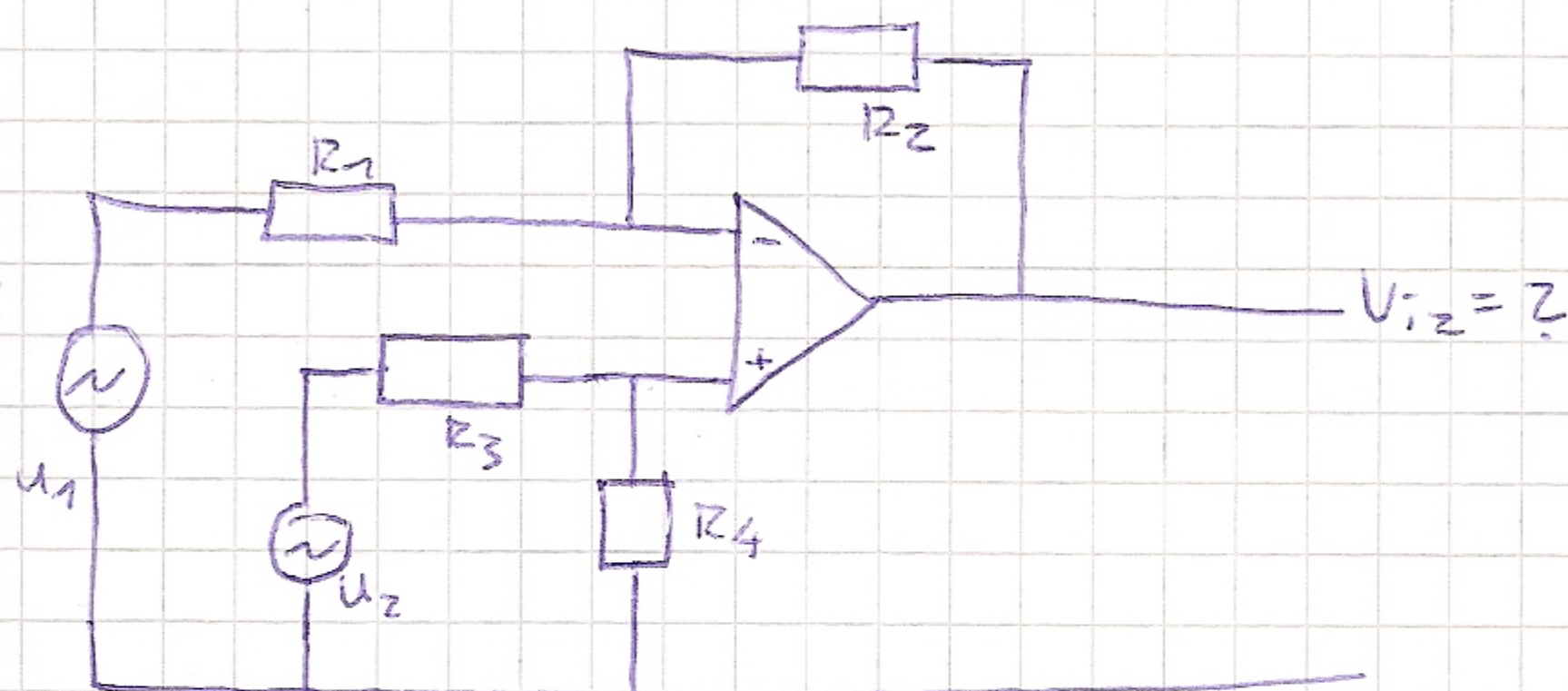
3



$$A_u = ?$$

$$A_u = -g_m (R_C \parallel R_L)$$

4



Določi izraz za izhodno napetost!

$$U_{i2} = U' + U''$$

$$U' = -\frac{R_2}{R_1} \cdot U_1$$

posebni primer
če je $R_3 = R_1$, $R_4 = R_2$

$$U'' = \left(1 + \frac{R_2}{R_1}\right) \frac{R_4}{R_3 + R_4} \cdot U_2$$

vstavimo v formulo R_1 pa R_2

$$\frac{R_1 + R_2}{R_1} \cdot \frac{R_2}{R_1 + R_2} = \frac{R_2}{R_1} \quad U_{i2} = (U_2 - U_1) \cdot \frac{R_2}{R_1}$$

Elektronika

Analogna

Analogni sistemi

-A/D, D/A

- Bipolarni in MOS-polprev. tehnologije
- Vežja z operacijskim ojačevalnikom
- Linearna el.

Digitalna

Digitalni sistemi

- Binarni in HEX zapis, osnovne aritmetične operacije, osnove booleve algebre
- Gradniki digitalnih vezij
- Polprevodniška tehn.
- CMOS

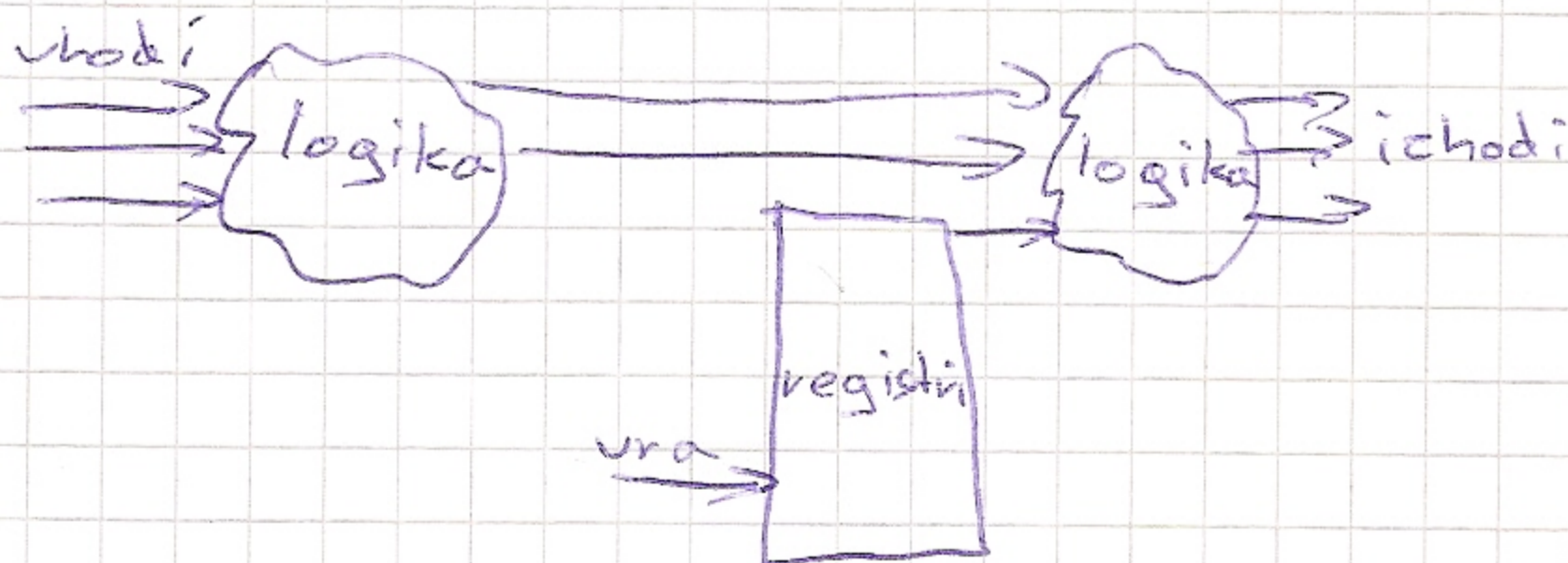
- Mikroprocesorji visjenivojski jez. assembler-zbirnik strojni jezik
- Programljiva log. vezja: • FPGA • CPLD
- ↳ Visokonivojski načrt. jeziki: -VHDL -VERILOG

-Razlika med mikroproc. in programljivimi log. vezji

↓
njegova naloga je zapečena na vezju

↓
lahko spreminjamo delovanje vezja s reprogramiranjem

Sekvenčno vezje



-adder (electronics)

-sekvenčni gradniki

-DSP vs UP

↳ digital signal processors