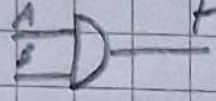
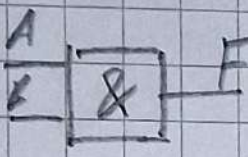
1. NOT, NAND, NOR, XOR, OR, AND.

AND





A	B	F
0	0	0
0	1	0
1	0	0
1	1	1

AB
$A \cdot B$
$A \& B$
$A \wedge B$

OR

A	B	F
0	0	0
0	1	1
1	0	1
1	1	1

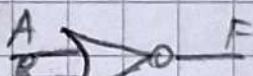
$A + B$
$A \vee B$

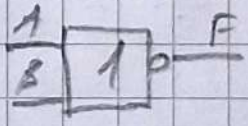
NOT

A	F
0	1
1	0

$-A$, $\sim A$, $\overline{A}$

NOR

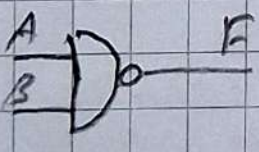




A	B	F
0	0	1
0	1	0
1	0	0
1	1	0

$\overline{A+B}$
$\overline{A \vee B}$

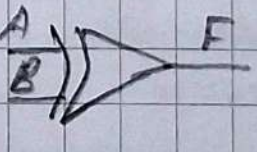
NAND



A	B	F
0	0	1
0	1	1
1	0	1
1	1	0

$\overline{AB}$ $\overline{A \cdot B}$ $\overline{A \& B}$ $\overline{A \wedge B}$

XOR



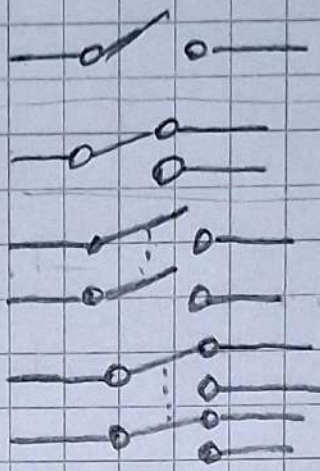
A	B	F
0	0	0
0	1	1
1	0	1
1	1	0

$A \oplus B$

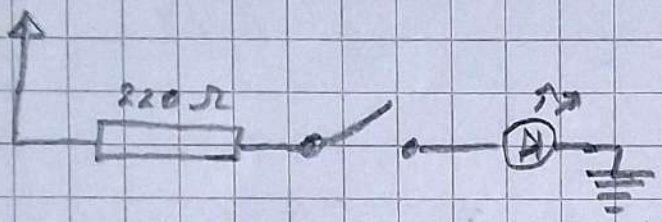
2. Prekidač, LED, PULL UP, PULL Down, current Limiter.

Električni prekidač - element koji dozvoljava da el. struja prođe ili ne.

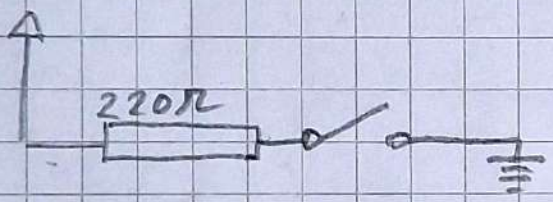
S - Single
D - dual
P - Pole
T - throw



LED i prekidač

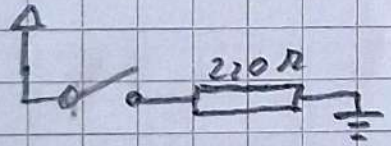


PULL UP



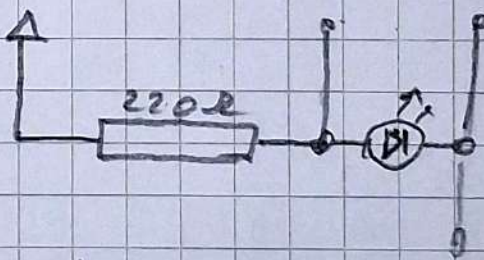
Otpornik je da obezbedi na sigurnu jedinicu.

pull down



Otpornik je da obezbedi na sigurnu nulu.

current limiter



Limitira koliko električne struje teče kroz potrošač, štiteći njega i izvor.

3) Binarno sabiranje, polusabirač, potpuni sabirač

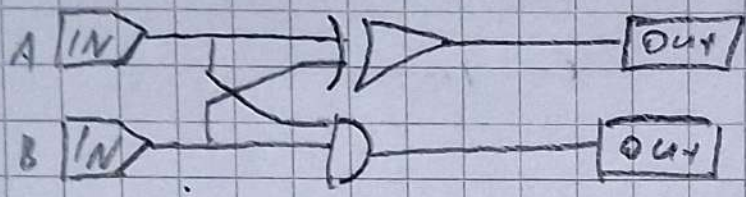
Binarno sabiranje:

$$\begin{array}{r} +\,0 \\ 0 \\ \hline 0 \end{array} \qquad \begin{array}{r} +\,0 \\ 1 \\ \hline 1 \end{array} \qquad \begin{array}{r} +\,1 \\ 0 \\ \hline 1 \end{array} \qquad \begin{array}{r} +\,1 \\ 1 \\ \hline 10 \end{array}$$

carry

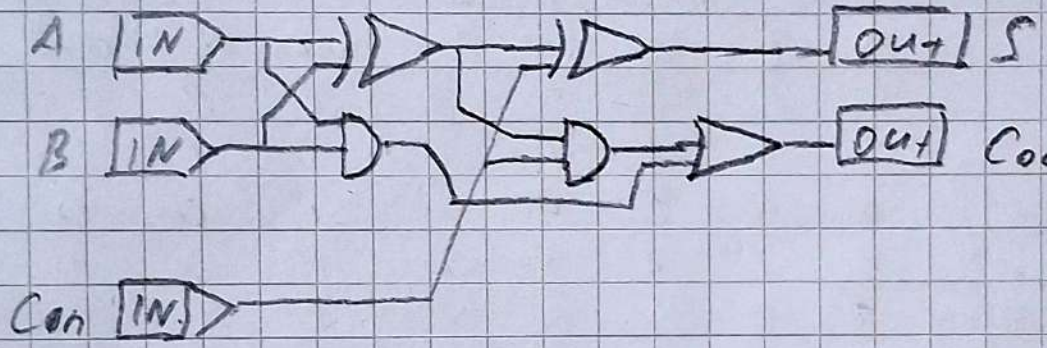
A \ B	0	1
0	0	1
1	1	0

Polusabirač



A	B	S	Cout
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Potpuni sabirač

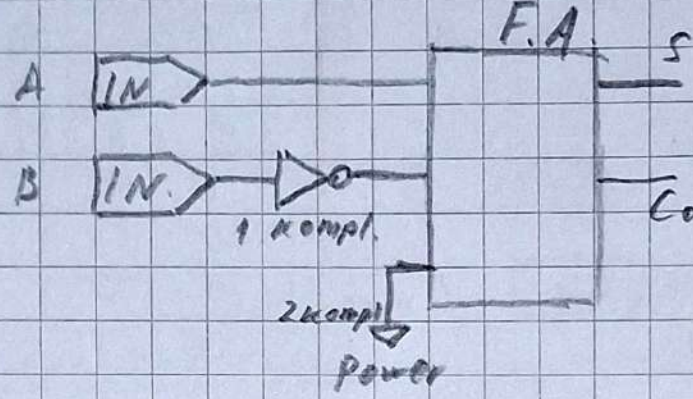


A	B	Cin	S	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

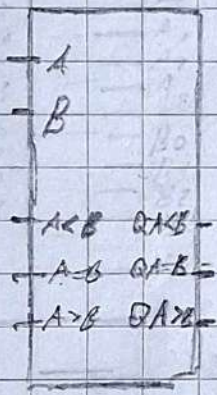
4) Binarno oduzimanje. Oduzimanje saporpuni sabiranjem.

A \ B	0	1
0	0	1
1	1	0

(0) ← borrow (carry)

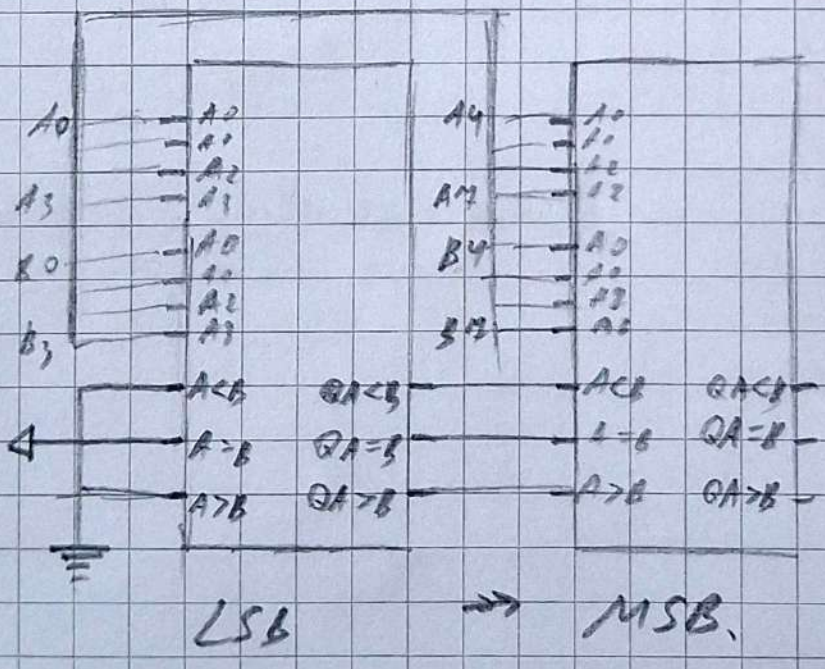


5). Binarni komparator, modularno poređenje brojeva binarnom komparatorom.



Ako A i B isto, prelazimo na prethodni rezultat

A	B	A<B	A=B	A>B	QA<B	QA=B	QA>B
0	0	0	0	1	0	0	1
0	0	0	1	0	0	1	0
0	0	1	0	0	1	0	0
0	1	x	x	x	1	0	0
1	0	x	x	x	0	0	1
1	1	0	0	1	0	0	1
1	1	0	1	0	0	1	0
1	1	1	0	0	1	0	0

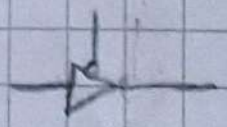


za A: 7 6 5 4 3 2 1 0

za B: 7 6 5 4 3 2 1 0

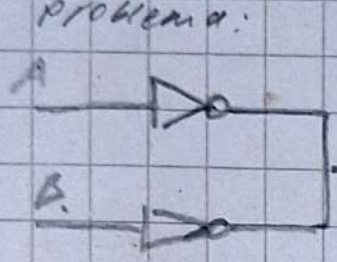
MSB LSB

6). Bafer sa tri stanja, dvosmerni drajver magistrale.

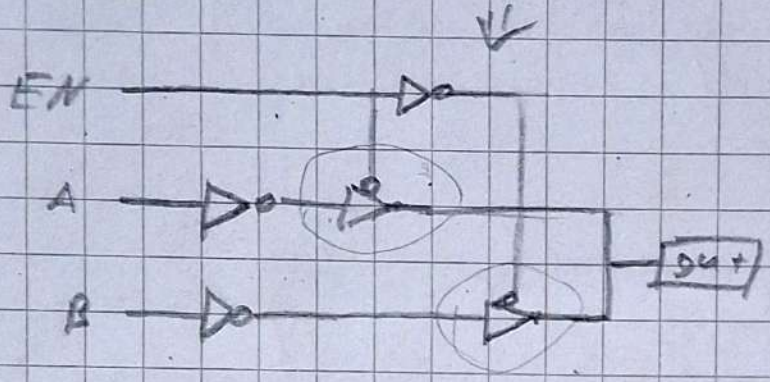


tri stanja: 0, 1, visoka impedansa

Problem:

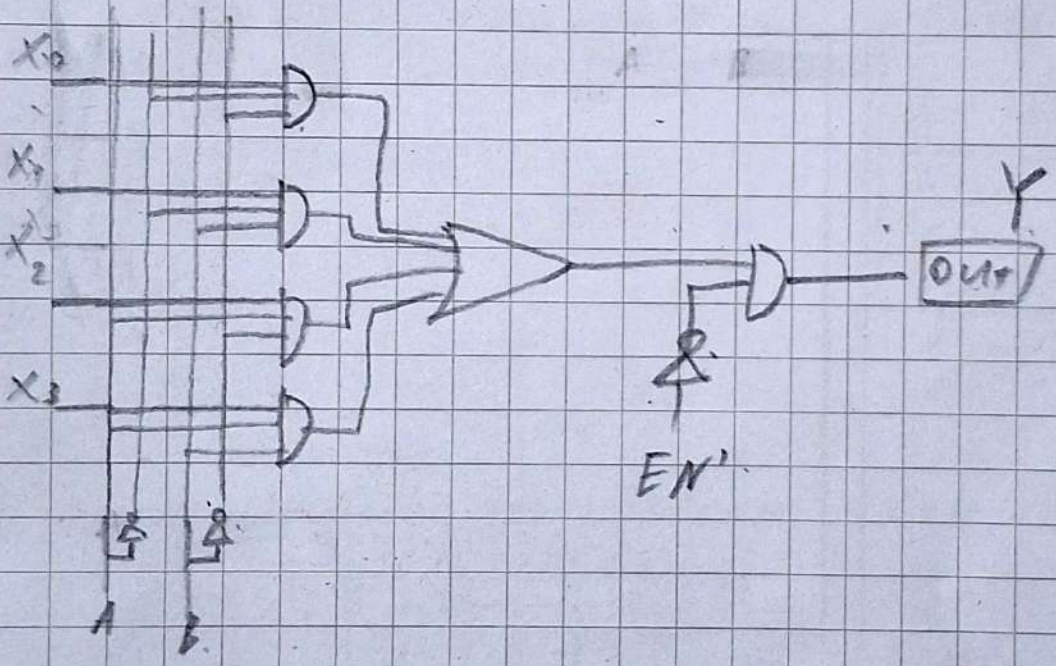


A	B	
0	0	-V
0	1	- greška
1	0	- greška
1	1	-V



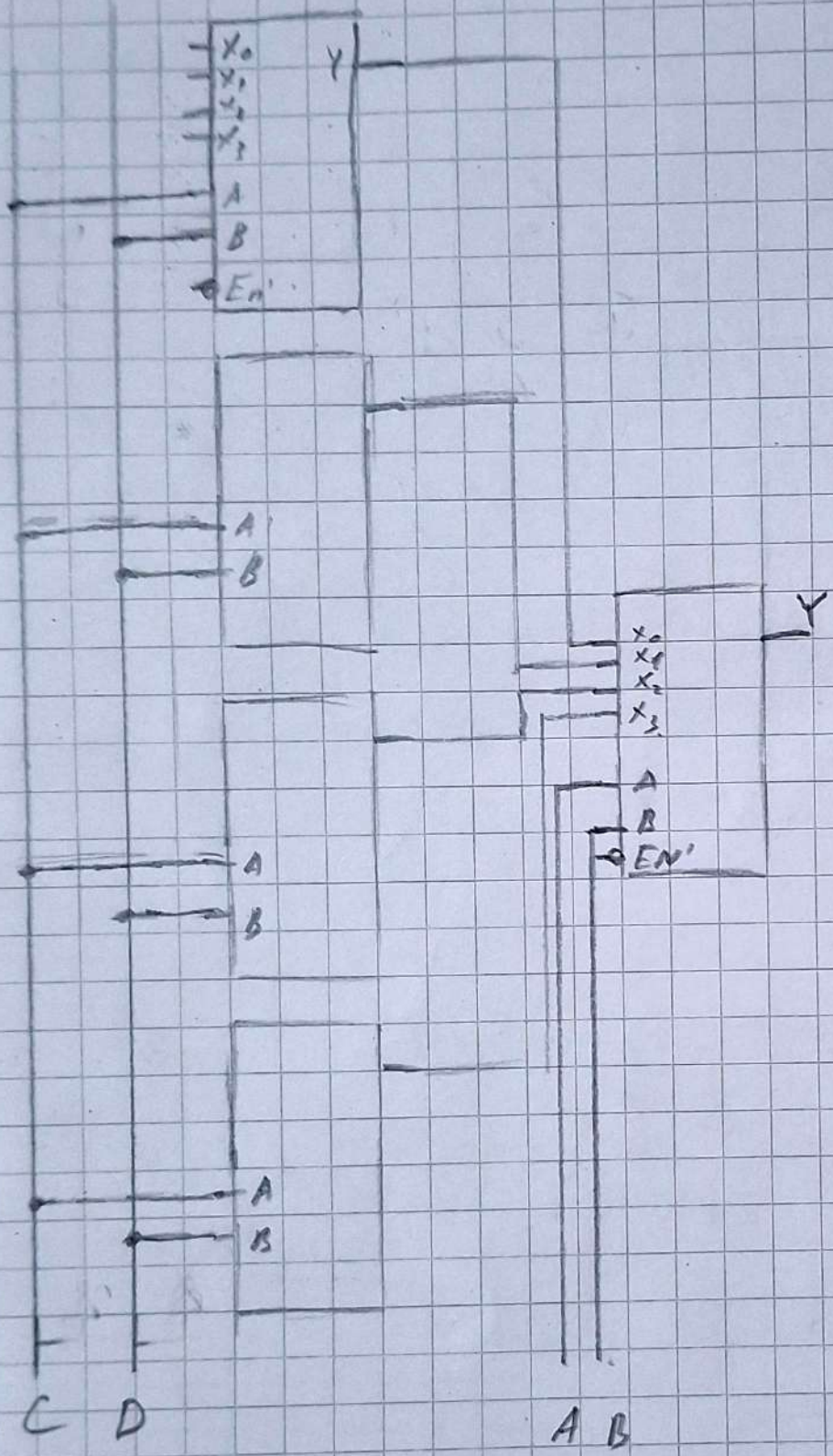
EN rade izbor između A i B žica.
Isključuje (visoka impedansa) žicu A ili B.

7) Dij. MUX. (4×1).

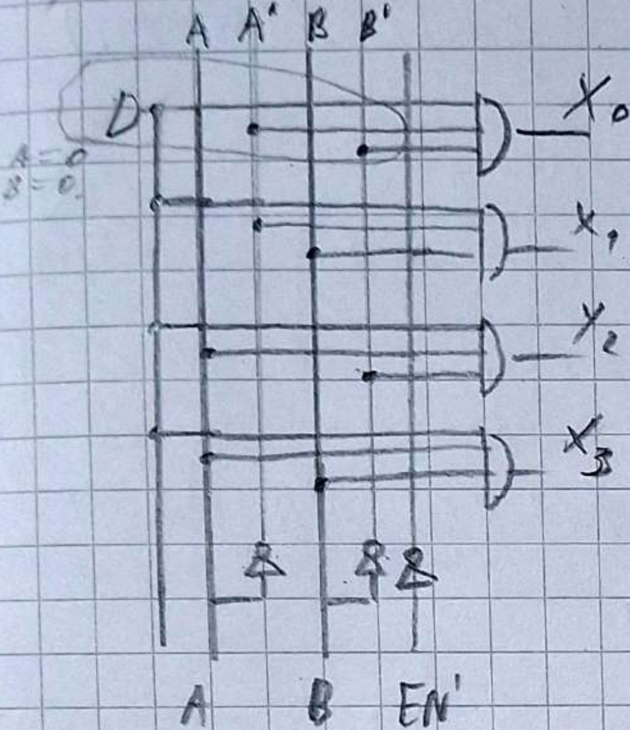


A	B	Y
0	0	x_0
0	1	x_1
1	0	x_2
1	1	x_3

1) Modulamo povećanje mux 4x1 => 16x1.



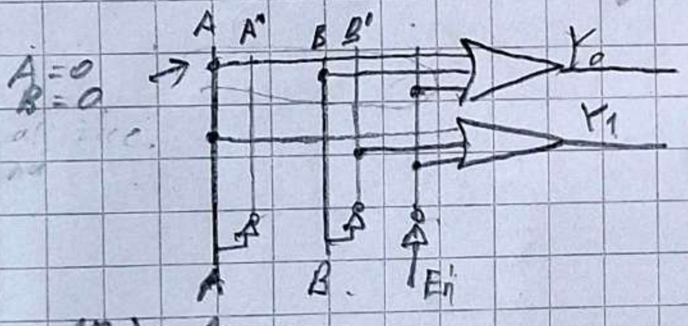
9). Demux 1x4.



A	B	E_n'	X_0	X_1	X_2	X_3
X	X	1	0	0	0	0
0	0	0	D	0	0	0
0	1	0	0	D	0	0
1	0	0	0	0	D	0
1	1	0	0	0	0	D

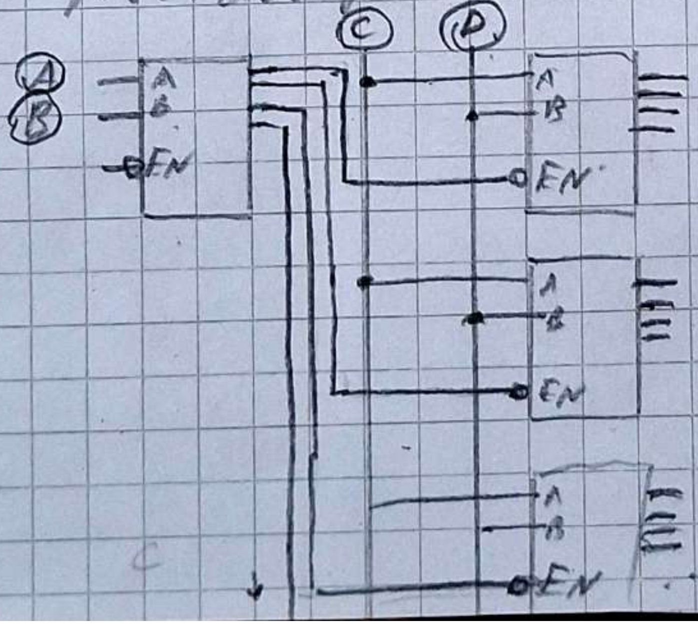
10) Pozitivni dekoder: isto ↑, samo bez D, i umesto D je "1"

11) Dekoder sa negacijem: isto ↑, ali umesto AND koristimo OR. i obrnuto rezultati



A	B	E_n	Y_0	Y_1	Y_2	Y_3
X	X	0	1	1	1	1
0	0	1	0	1	1	1
0	1	1	1	0	1	1
1	0	1	1	1	0	1
1	1	1	1	1	1	0

12) Modularno povezivanje dekodera. (2x4 → 4x16)



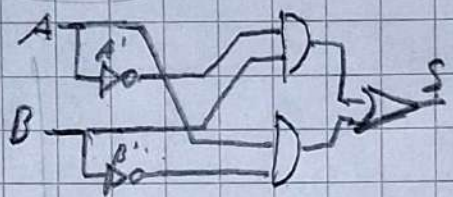
i tamo 4 dekoder (nisam imao mesta)

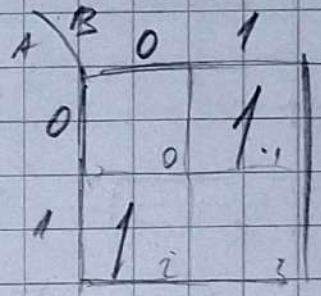
13) Kombinacionaja funkcija (Minterm) – Ovde primer za binarni sobirač Sa input

$f(A,B) = \Sigma(m_1, m_2)$

S.

A	B	F(A,B)	
0	0	0	m_0
0	1	1	m_1
1	0	1	m_2
1	1	0	m_3





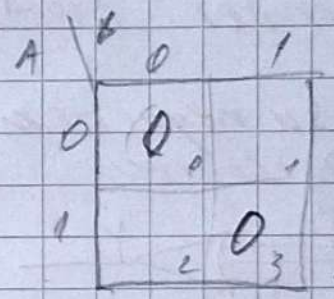
SOP

↑ naziv minterm funkcije

$f(A,B) = A'B + A \cdot B'$

14) Maxterm.

$F(A,B) = \prod (M_0, M_3)$



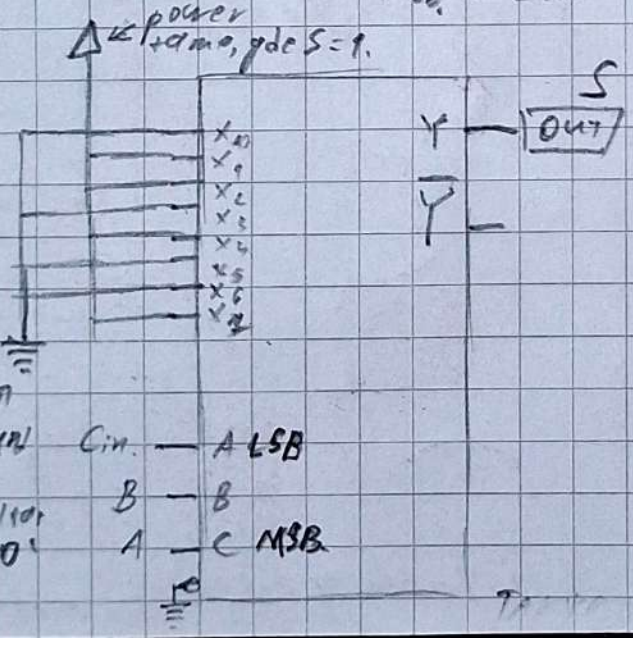
POS

↑ naziv maxterm funkcije

$F(A,B) = (A' + B') \cdot (A+B)$

15).

Mux 8x1. (C B A).
MSB ← LSB

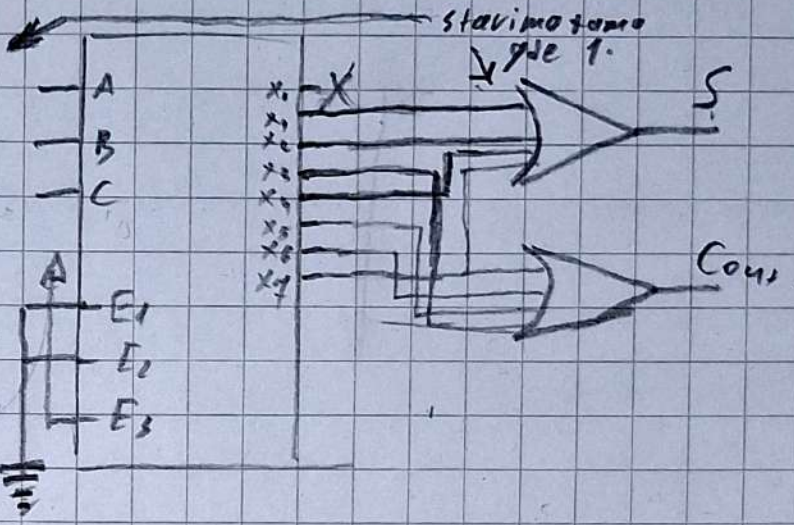


mux

A	B	C_{in}	S	Cout
0	0	0	0 x_0	
0	0	1	1 x_1	
0	1	0	1 x_2	
0	1	1	0 x_3	
1	0	0	1 x_4	
1	0	1	0 x_5	
1	1	0	0 x_6	
1	1	1	1 x_7	1

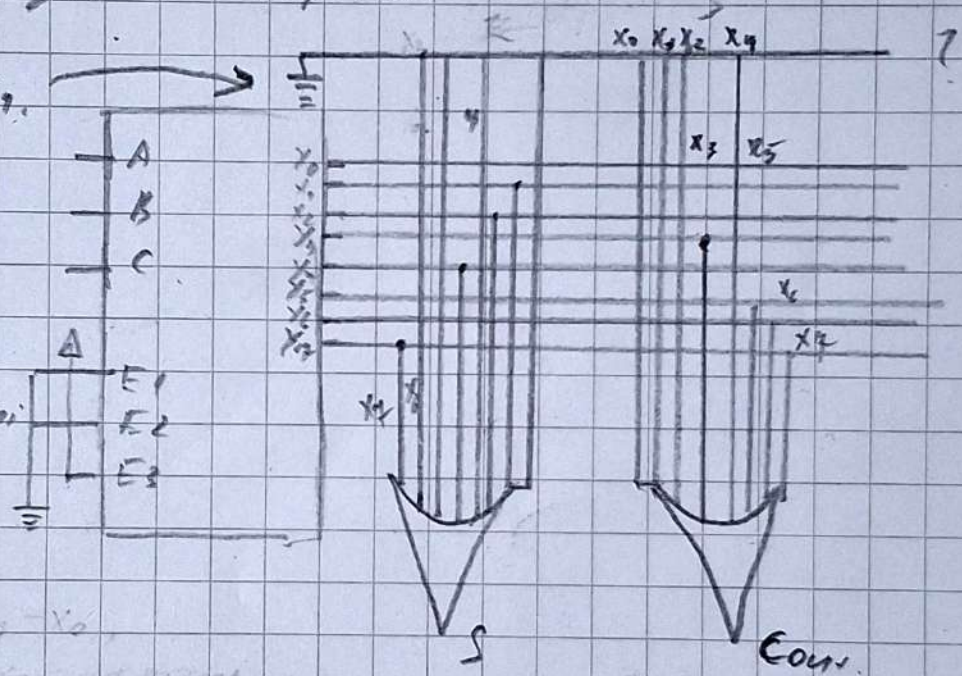
16). Kombinac. logika - dekoder (za binarni sabirač sa S i Cout).

A	B	Cin	S	Cout	
0	0	0	0	0	x_0
0	0	1	1	0	x_1
0	1	0	1	0	x_2
0	1	1	0	1	x_3
1	0	0	1	0	x_4
1	0	1	0	1	x_5
1	1	0	0	1	x_6
1	1	1	1	1	x_7



17) kombinac. logika - eeprom.

tabelarni pišemo od x_0 do x_7.



Objašnjenje:
EEprom koriste memoriju. U EEprom mi dodajemo fajl sa heksadecimalnim brojevima - Mapu sa izlazima.

18) RS