

OSNOVE DIGITALNE ELEKTRONIKE

K-tablice

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A	B	Output
0	0	α
0	1	β
1	0	χ
1	1	δ

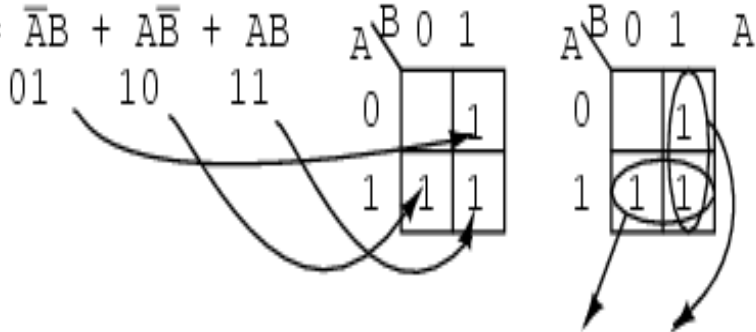
A \ B	0	1
0	α	β
1	χ	δ

$$\text{Out} = \bar{A}\bar{B}CD + \bar{A}BCD + ABCD + A\bar{B}CD + AB\bar{C}\bar{D} + AB\bar{C}D + ABC\bar{D}$$

A \ B \ CD	00	01	11	10
00			1	
01			1	
11	1	1	1	1
10			1	

$$\text{Out} = AB + CD$$

$$\text{Out} = \bar{A}B + A\bar{B} + AB$$



$$\text{Output} = A + B$$

$$\text{Out} = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C$$

A \ BC	00	01	11	10
0	1	1		
1				

$$\text{Out} = \bar{A}\bar{B}$$

f(A,B)		A	
		0	1
B	0	0	2
	1	1	3

f(A,B,C)			AB		
			00	01	11
C	0	0	2	6	4
	1	1	3	7	5

f(A,B,C,D)				AB			
				00	01	11	10
CD	00	0	4	12	8		
	01	1	5	13	9		
	11	3	7	15	11		
	10	2	6	14	10		

Pomoću K-tablice minimizirajte funkciju:

$$f(A,B,C) = \sum(1, 2, 5, 6, 7)$$

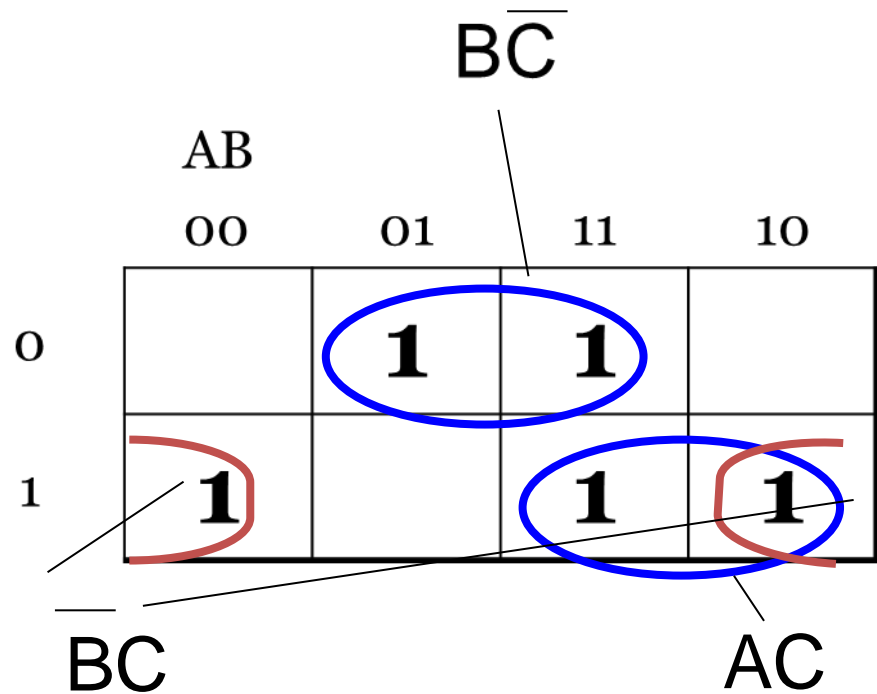
				A

	00	01	11	10
0				
1				
C				

				B

A	B	C	f
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

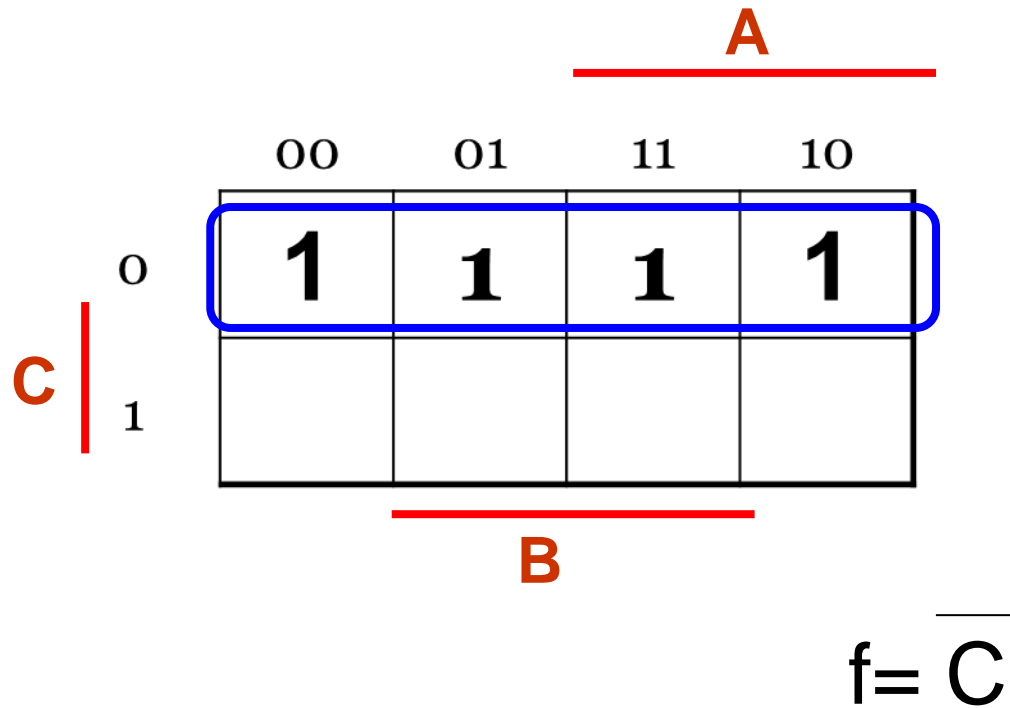
$f(A,B,C)=\Sigma(1, 2, 5, 6, 7)$ - rješenje



A	B	C	f
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

$$f = \overline{BC} + \overline{BC} + AC$$

Pomoću K-tablice minimizirajte funkciju:
 $f(A,B,C)=\Sigma(0, 2, 4, 6)$



A	B	C	f
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

Pomoću K-tablice minimizirajte funkciju:

$$f(A,B,C) = \Sigma(0, 2, 3, 5, 7)$$

			<u>A</u>	
	00	01	11	10
<u>C</u>	1	1		
		1	1	1
	<u>B</u>			

A	B	C	f
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

$$f = \bar{A}\bar{C} + AC + \bar{A}B$$

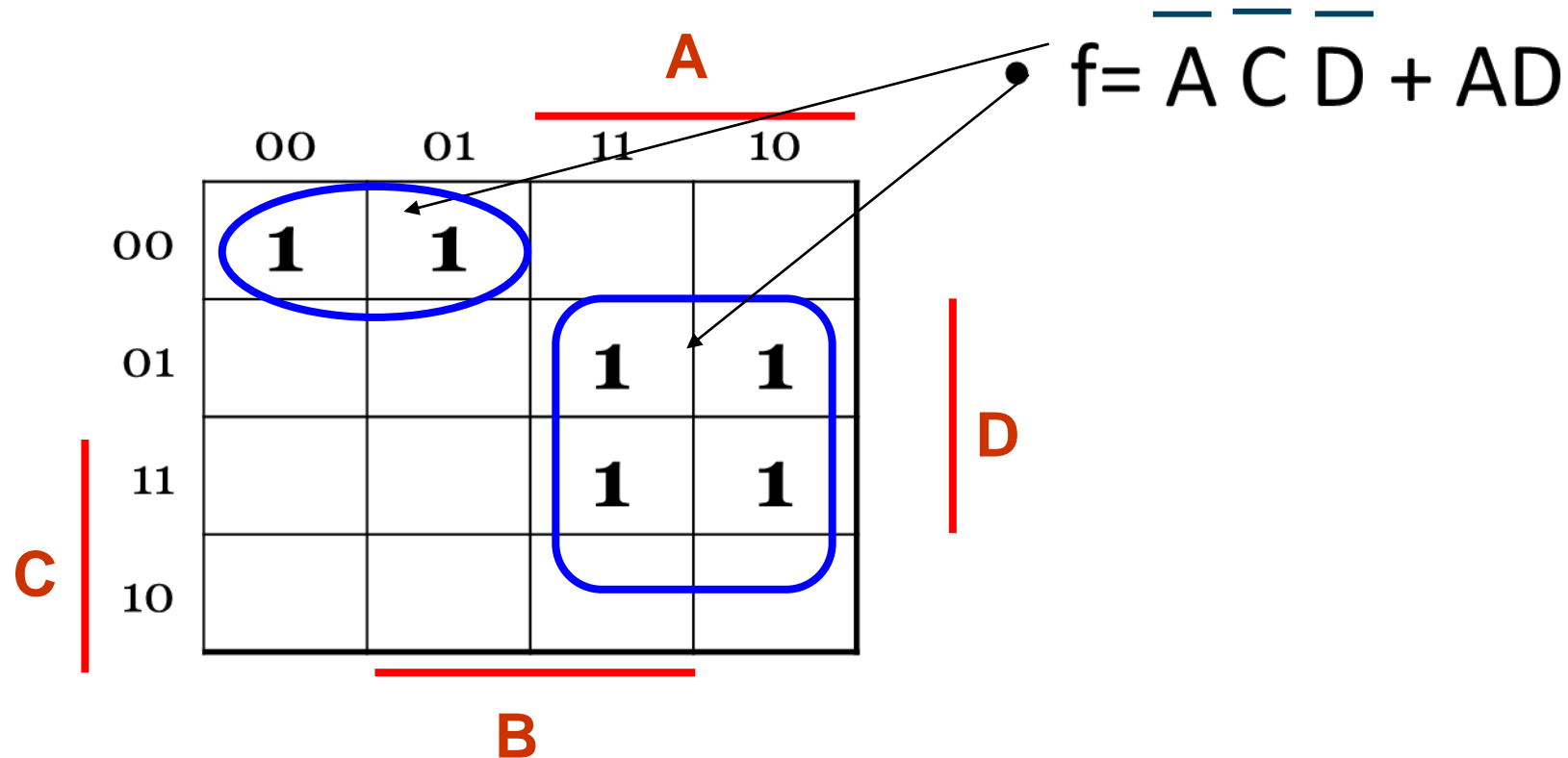
Rješenje pomoću simulatora

ABC	
000	1
001	0
010	1
011	1
100	0
101	1
110	0
111	1

	AB	00	01	11	10	
C	0	1	1	0	0	0
1	0	1	1	1	1	1
		00	01	11	10	C
						AB

A'C'
AC
A'B

Minimizirajte funkciju
 $f = \Sigma(0, 4, 9, 11, 13, 15)$ pomoću K-tablice



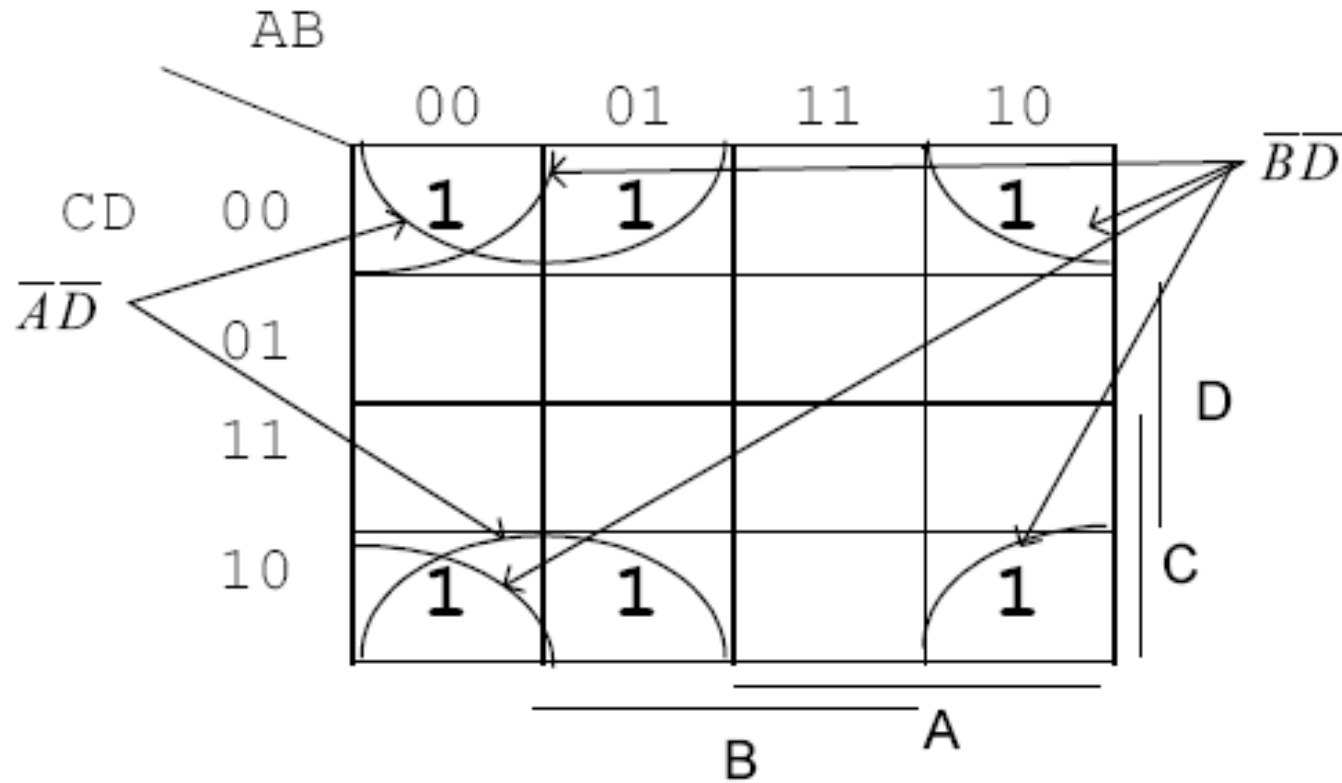
A	B	C	D	f
0	0	0	0	1
0	0	0	1	
0	0	1	0	
0	0	1	1	
0	1	0	0	1
0	1	0	1	
0	1	1	0	
0	1	1	1	
1	0	0	0	
1	0	0	1	1
1	0	1	0	
1	0	1	1	1
1	1	0	0	
1	1	0	1	1
1	1	1	0	
1	1	1	1	1

ABCD	
0000	1
0001	0
0010	0
0011	0
0100	1
0101	0
0110	0
0111	0
1000	0
1001	1
1010	0
1011	1
1100	0
1101	1
1110	0
1111	1

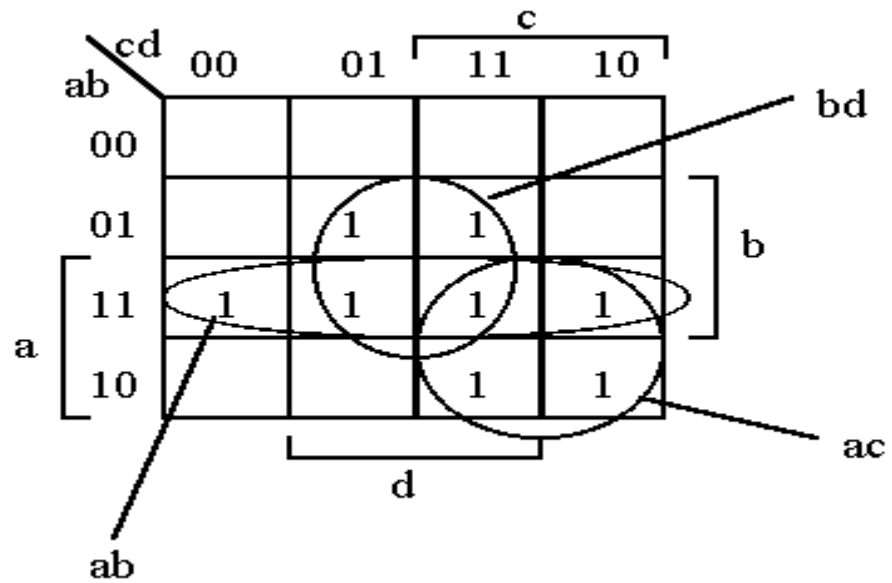
AB \ CD	00	01	11	10	
00	1	1	0	0	00
01	0	0	1	1	01
11	0	0	1	1	11
10	0	0	0	0	10
	00	01	11	10	CD

AD
A'C'D'

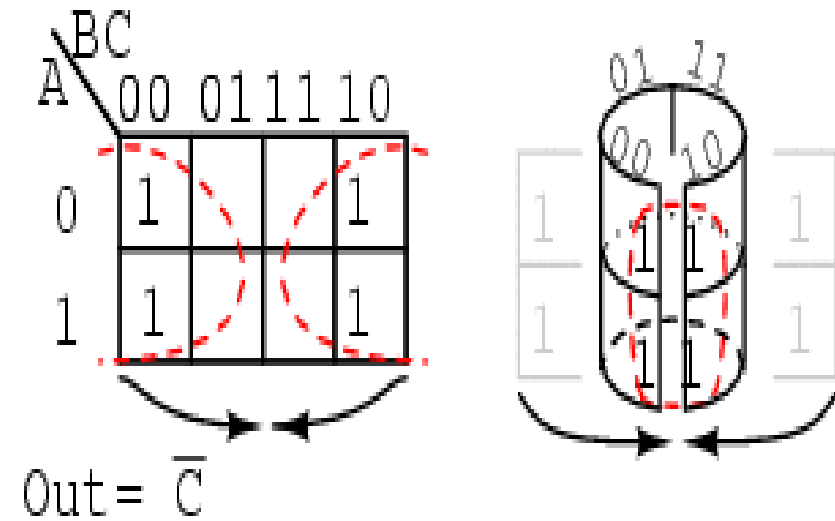
Minimizirajte funkciju
 $f = \Sigma(0, 2, 4, 6, 8, 10)$ pomoću K-tablice



$$f = \overline{A}\overline{D} + \overline{B}\overline{D}$$

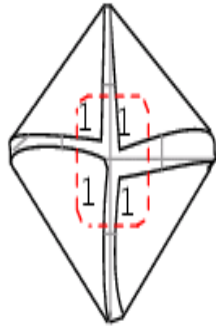


$$\text{Out} = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}C$$



$$\text{Out} = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D} + \bar{A}BC\bar{D}$$

	CD			
A/B	00	01	11	10
00	1			1
01				
11				
10	1			1



$$\text{Out} = \bar{R}\bar{D}$$

$$\text{Out} = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}D + \bar{A}BCD + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}D + \bar{A}BC\bar{D}$$

	CD			
A/B	00	01	11	10
00	1	1	1	1
01				
11				
10	1	1	1	1

$$\text{Out} = \bar{B}$$

$$\text{Out} = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}D + \bar{A}BCD + ABCD + ABC\bar{D} + A\bar{B}C\bar{D} + A\bar{B}CD$$

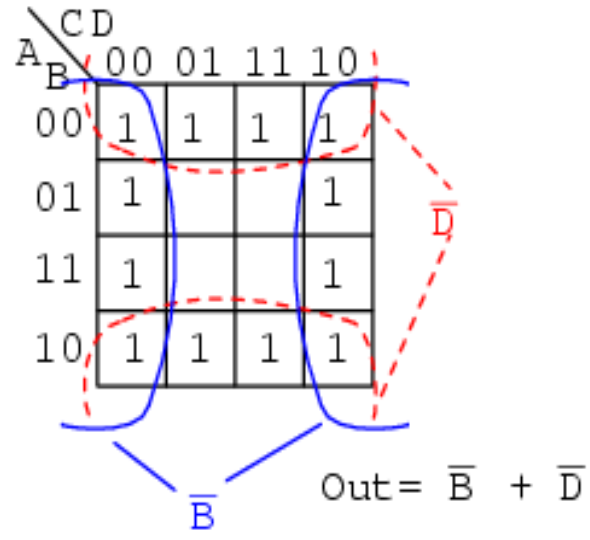
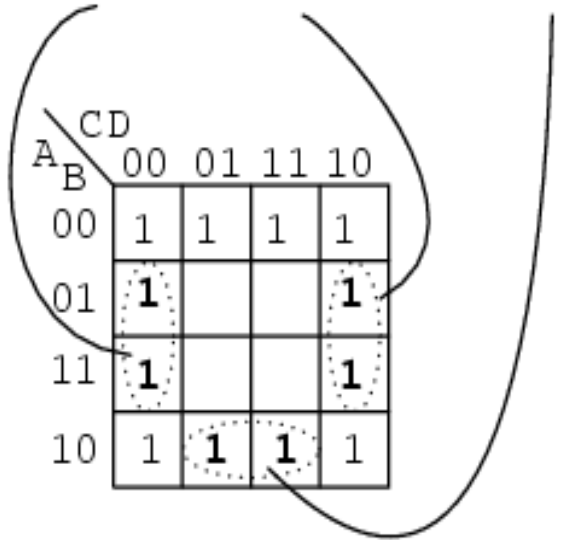
	CD			
A/B	00	01	11	10
00	1	1		
01		1	1	
11			1	1
10	1			1

	CD			
A/B	00	01	11	10
00	1	1		
01		1	1	
11			1	1
10	1			1

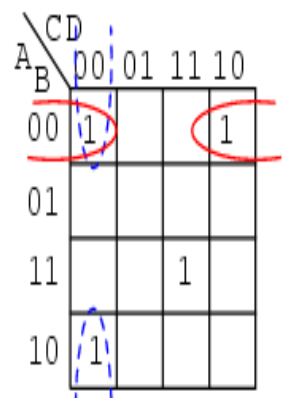
$$\text{Out} = \bar{B}\bar{C}\bar{D} + \bar{A}\bar{C}D + BCD + AC\bar{D}$$

$$\text{Out} = \bar{A}\bar{B}\bar{C} + \bar{A}BD + ABC + A\bar{B}\bar{D}$$

$$\text{Out} = \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + \overline{A}B\overline{C}\overline{D} + \overline{A}BC\overline{D} \\ + B\overline{C}\overline{D} + BC\overline{D} + A\overline{B}\overline{C}\overline{D} + A\overline{B}D + A\overline{B}C\overline{D}$$



$$\text{Out} = \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + A\overline{B}\overline{C}\overline{D} + ABCD$$



$$\text{Out} = \overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}\overline{D} + ABCD$$

$$\text{Out} = \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + \overline{A}B\overline{C}\overline{D} + \overline{A}BC\overline{D} + A\overline{B}\overline{C}\overline{D} \\ + A\overline{B}C\overline{D} + ABC\overline{D} + A\overline{B}C\overline{D} + A\overline{B}CD$$

		CD			
		00	01	11	10
A B	00	1		1	
	01	1		1	
	11	1	1	1	
	10	1		1	

$$\text{Out} = \overline{C}\overline{D} + CD + A\overline{B}\overline{C}$$

		CD			
		00	01	11	10
A B	00	1		1	
	01	1		1	
	11	1	1	1	
	10	1		1	

$$\text{Out} = \overline{C}\overline{D} + CD + ABD$$

$$\text{Out} = \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + \overline{A}B\overline{C}\overline{D} \\ + \overline{A}BC\overline{D} + \overline{A}B\overline{C}D + \overline{A}BCD \\ + A\overline{B}\overline{C}\overline{D} + A\overline{B}C\overline{D} + ABC\overline{D}$$

		CD			
		00	01	11	10
A B	00	1	1	1	
	01	1	1	1	
	11	1	1	1	
	10				

		CD			
		00	01	11	10
A B	00	1	1	1	
	01	1	1	1	
	11	1	1	1	
	10				

$$\text{Out} = \overline{A}\overline{C} + \overline{A}D + B\overline{C} + BD$$

		CD			
		00	01	11	10
A B	00	1	1	1	
	01	1	1	1	
	11	1	1	1	
	10				

Pomoću K-tablice minimizirajte funkciju:
 $f(A,B,C) = \prod(0, 2, 3, 7)$ - rješenje

	00	01	11	10
0	0	0		
1		0	0	

$$f = A\bar{C} + B\bar{C}$$

$$f = (A+C)(\bar{B}+\bar{C})$$

A	B	C	f
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

pomoću K-tablice minimizirati funkciju:

$$f(A,B,C) = \prod(0, 1, 6, 7)$$

A	B	C	f
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

ABC	
000	0
001	0
010	1
011	1
100	1
101	1
110	0
111	0

AB	00	01	11	10	
C					
0	0	1	0	1	0
1	0	1	0	1	1
	00	01	11	10	C
	AB				

Legend: A+B, A'+B'

Pomoću K-tablice minimizirati funkciju
 $f = \prod(0, 1, 4, 5, 10, 11, 14, 15)$

A	B	C	D	f
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

ABCD	
0000	0
0001	0
0010	1
0011	1
0100	0
0101	0
0110	1
0111	1
1000	1
1001	1
1010	0
1011	0
1100	1
1101	1
1110	0
1111	0

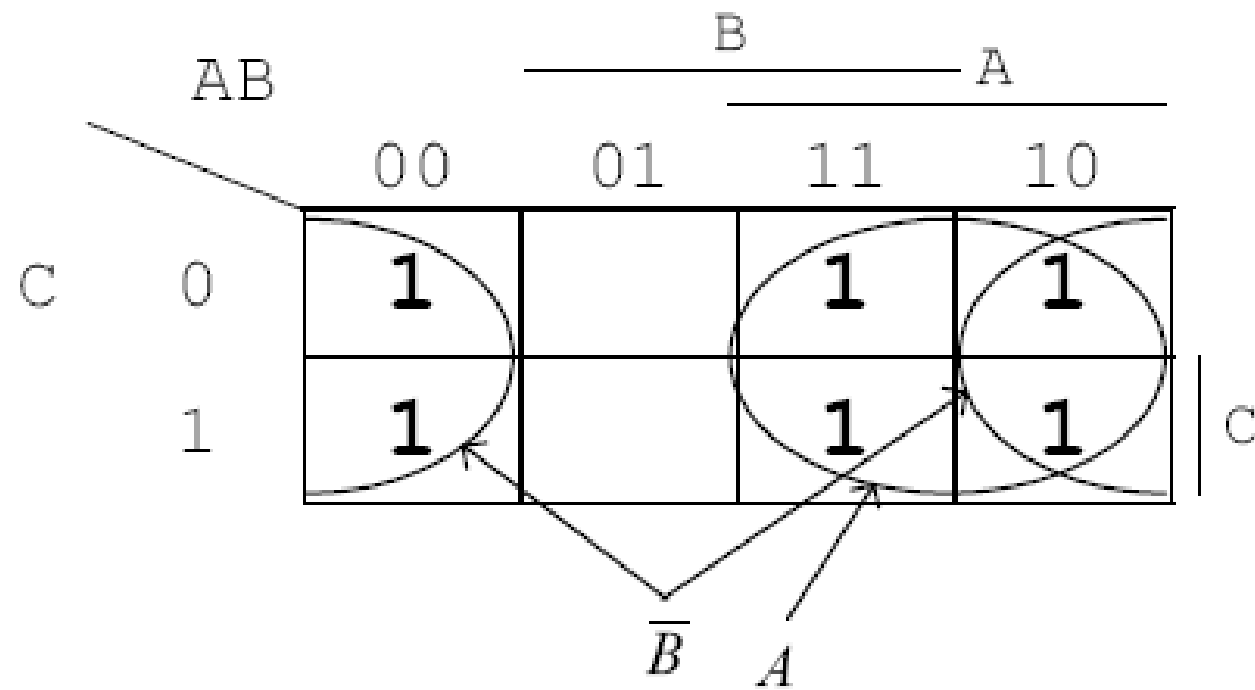
AB \ CD	00	01	11	10	
00	0	0	1	1	00
01	0	0	1	1	01
11	1	1	0	0	11
10	1	1	0	0	10
	00	01	11	10	CD
					AB

A+C
A'+C'

Pomoću K-tablice minimizirati funkciju :

$$\begin{aligned} f &= \overline{A}\overline{B}\overline{C} + AC + AB\overline{C} + \overline{A}\overline{B}C + A\overline{B}\overline{C} \\ &= \overline{A}\overline{B}\overline{C} + A(B + \overline{B})C + AB\overline{C} + \overline{A}\overline{B}C + A\overline{B}\overline{C} \\ &= \overline{A}\overline{B}\overline{C} + ABC + A\overline{B}C + AB\overline{C} + \overline{A}\overline{B}C + A\overline{B}\overline{C} \\ &= \sum(0,7,5,6,1,4) \\ &= \sum(0,1,4,5,6,7) \end{aligned}$$

- $f = A + \overline{B}$



Neodređena polja

- Ukoliko funkcija sadrži polja za koja nije određena vrijednost (označena sa $d, ?, *, n, x \dots$), njih tumačimo na način koji nam odgovara u cilju grupiranja jedinica u što manji broj što većih grupa.

L1

		BC			
A		00	01	11	10
0	0	1	1	1	
1	1	1	*	*	

$L1 = A + B + C$

L2

		BC			
A		00	01	11	10
0	0	0	1	1	
1	1	1	*	*	

$L2 = A + B$

L3

		BC			
A		00	01	11	10
0	0	0	1	0	
1	1	1	*	*	

$L3 = A + BC$

L4

		BC			
A		00	01	11	10
0	0	0	0	0	
1	1	1	*	*	

$L4 = A$

L5

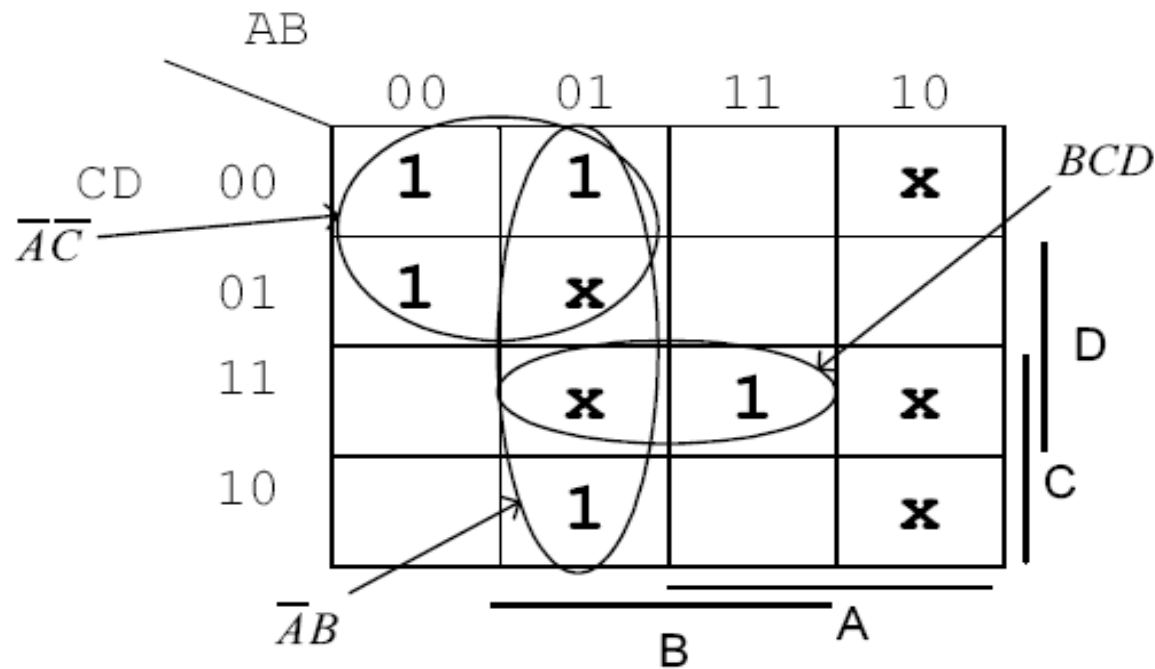
		BC			
A		00	01	11	10
0	0	0	0	0	
1	0	1	*	*	

$L5 = AC$

		c			
		00	01	11	10
a	ab				
	00		1	1	1
	01		1	1	
	11	d	d	d	d
	10			d	d

Pomoću K-tablice minimizirati funkciju

$$f = \sum m(0,1,4,6,15) + \sum d(5,7,8,10,11)$$



$$f = \bar{A}\bar{C} + \bar{A}B + BCD$$