

DIGITALNA LOGIKA

K-tablice

K-tablice

A	B	Output
0	0	α
0	1	β
1	0	χ
1	1	δ

A	B	
0	0	α
0	1	β
1	0	χ
1	1	δ

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

CD	00	01	11	10
AB				
00			1	
01			1	
11	1	1	1	1
10			1	

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

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

Output = $A + B$

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

BC	00	01	11	10
A				
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	10
C	0	2	6	4
	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		

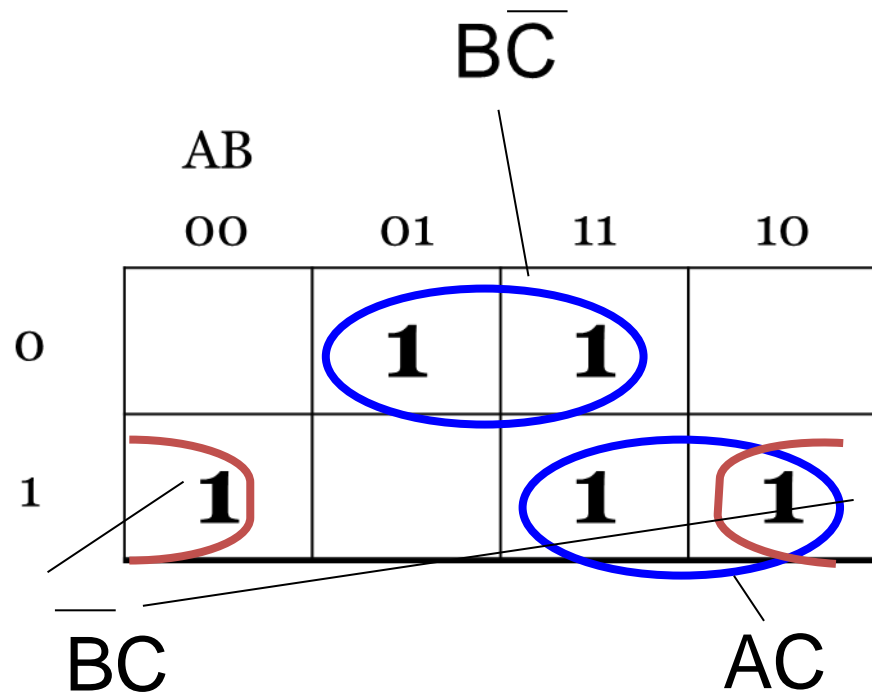
Pomoću K-tablice minimizirajte funkciju:

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

		A			
		<hr/>			
		00	01	11	10
C	0				
	1				
		<hr/>			
		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:
 $f(A,B,C)=\Sigma(0, 2, 4, 6)$

		<u>A</u>			
		00	01	11	10
<u>C</u>	0	1	1	1	1
	1				
		<u>B</u>			

$f = \overline{C}$

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:

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

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

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

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

Rješenje pomoću simulatora

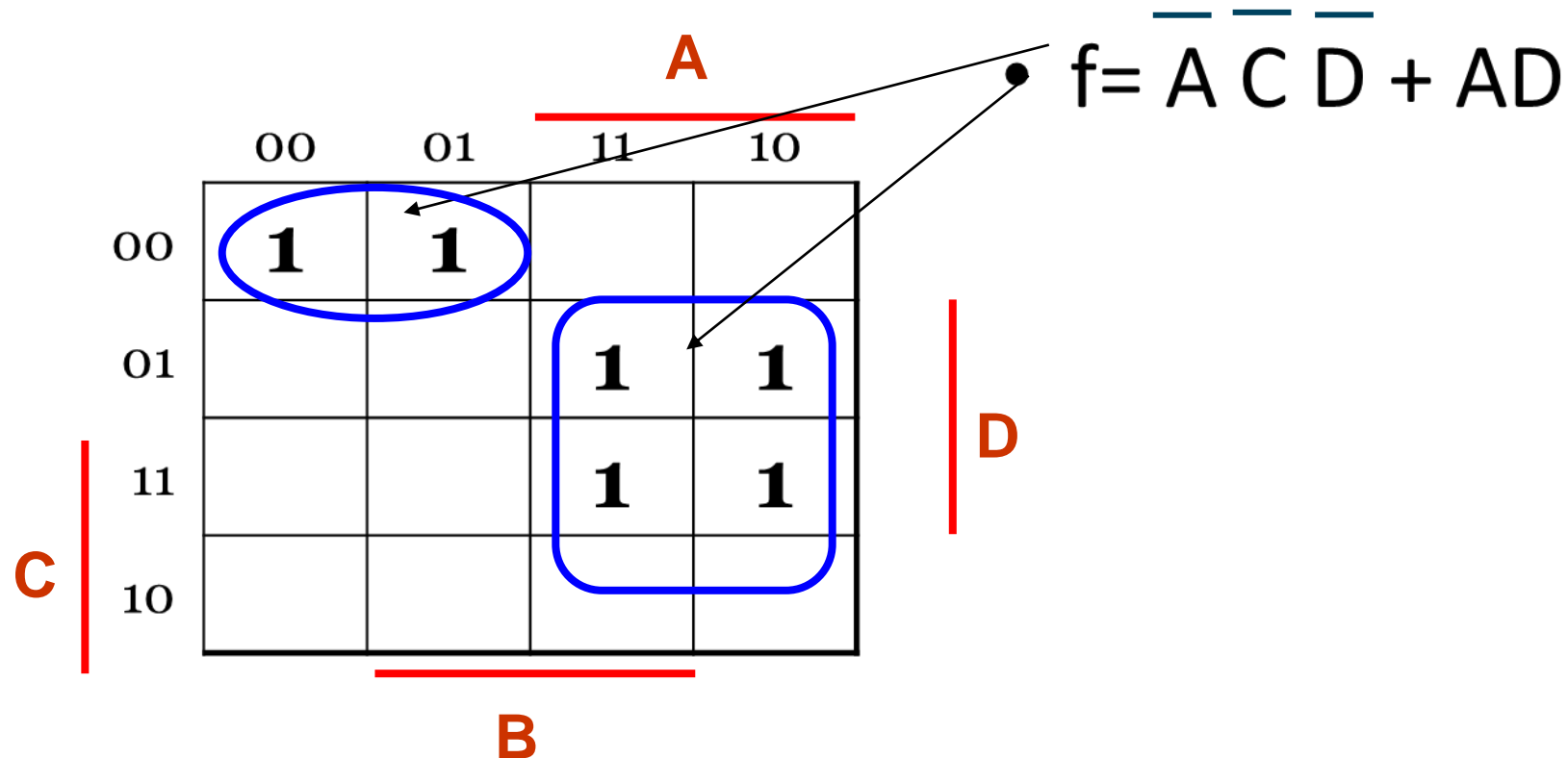
ABC											
000	1	C	AB				00	01	11	10	C
001	0						00	01	11	10	
010	1	0	1	1	0	0	0	0	0	0	0
011	1	1	0	1	1	1	1	1	1	1	1
100	0										
101	1										
110	0										
111	1										
							00	01	11	10	AB

A'C'

AC

A'B

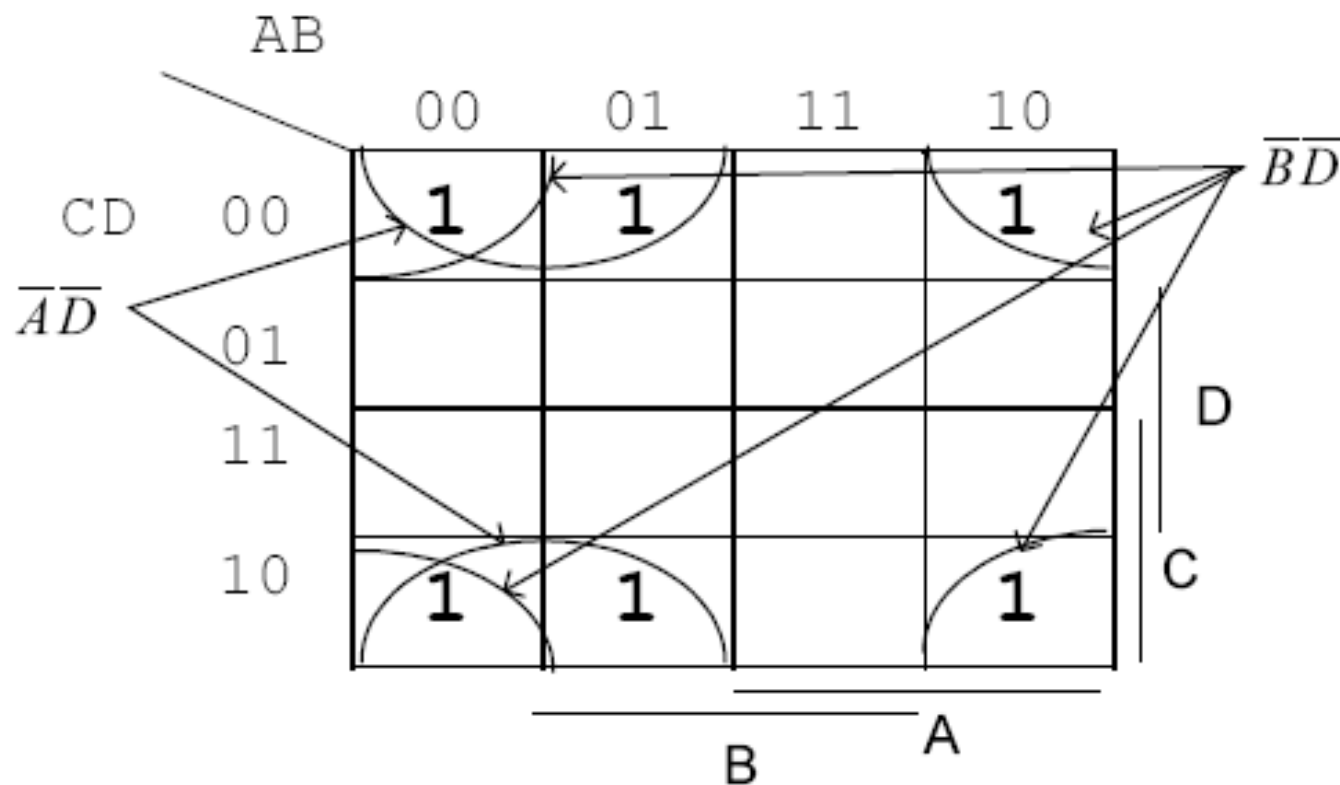
Minimizirajte funkciju
 $f = \Sigma(0, 4, 9, 11, 13, 15)$ pomoću K-tablice



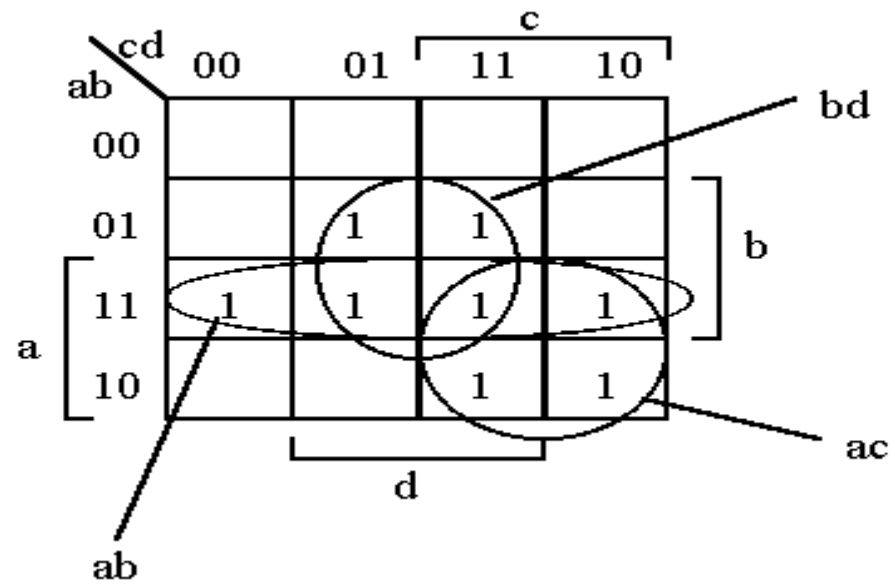
A	B	C	D	f
0	0	0	0	1
0	0	0	1	
0	0	1	0	
0	0	1	1	
0	1	0	0	1
0	1	0	1	
0	1	1	0	
0	1	1	1	
1	0	0	0	
1	0	0	1	1
1	0	1	0	
1	0	1	1	1
1	1	0	0	
1	1	0	1	1
1	1	1	0	
1	1	1	1	1

ABCD															
0000	1	CD	AB		00	01	11	10		AD					
0001	0														
0010	0														
0011	0														
0100	1	CD								AD					
0101	0														
0110	0														
0111	0														
1000	0	CD								AD					
1001	1														
1010	0														
1011	1														
1100	0	CD								AD					
1101	1														
1110	0														
1111	1														

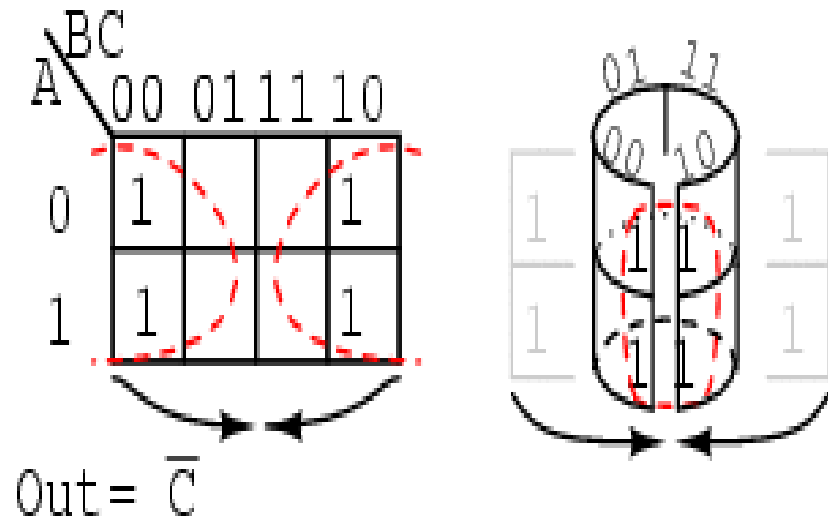
Minimizirajte funkciju
 $f = \Sigma(0, 2, 4, 6, 8, 10)$ pomoću K-tablice



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



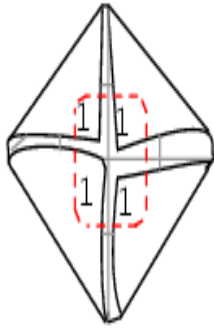
$$\text{Out} = \overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C} + \overline{A}B\overline{C} + AB\overline{C}$$



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

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

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



$$\begin{aligned} \text{Out} = & \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + \overline{A}B\overline{C}\overline{D} + \overline{A}BC\overline{D} \\ & + \overline{A}\overline{B}\overline{C}D + \overline{A}\overline{B}CD + \overline{A}B\overline{C}D + \overline{A}BCD \end{aligned}$$

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

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

$$\begin{aligned} \text{Out} = & \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + \overline{A}B\overline{C}\overline{D} + \overline{A}BC\overline{D} \\ & + \overline{A}\overline{B}\overline{C}D + \overline{A}\overline{B}CD + \overline{A}B\overline{C}D + \overline{A}BCD \end{aligned}$$

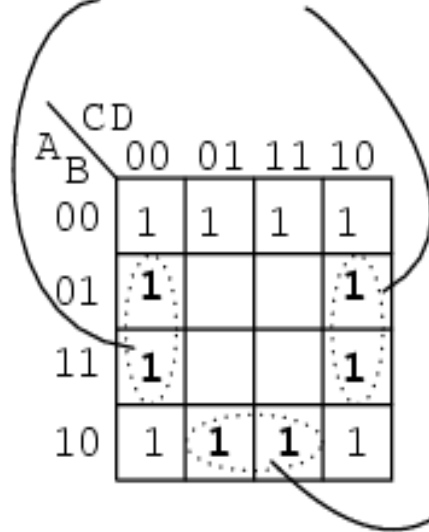
A \ B \ CD	00	01	11	10
00	1	1		
01		1	1	
11			1	1
10	1			1

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

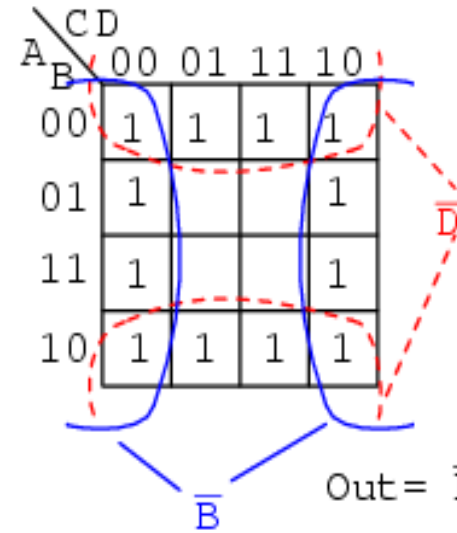
$$\text{Out} = \overline{A}\overline{B}\overline{C} + \overline{A}BD + ABC + A\overline{B}\overline{D}$$

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

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



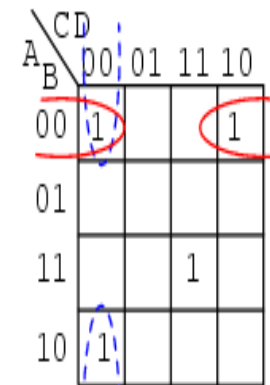
A \ B \ CD	00	01	11	10
00	1	1	1	1
01	1			1
11	1			1
10	1	1	1	1



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

Out = $\overline{B} + \overline{D}$

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



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

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

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

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

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

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

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

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

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

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

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

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

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

A+B	
A+B	1
A'+B'	0

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

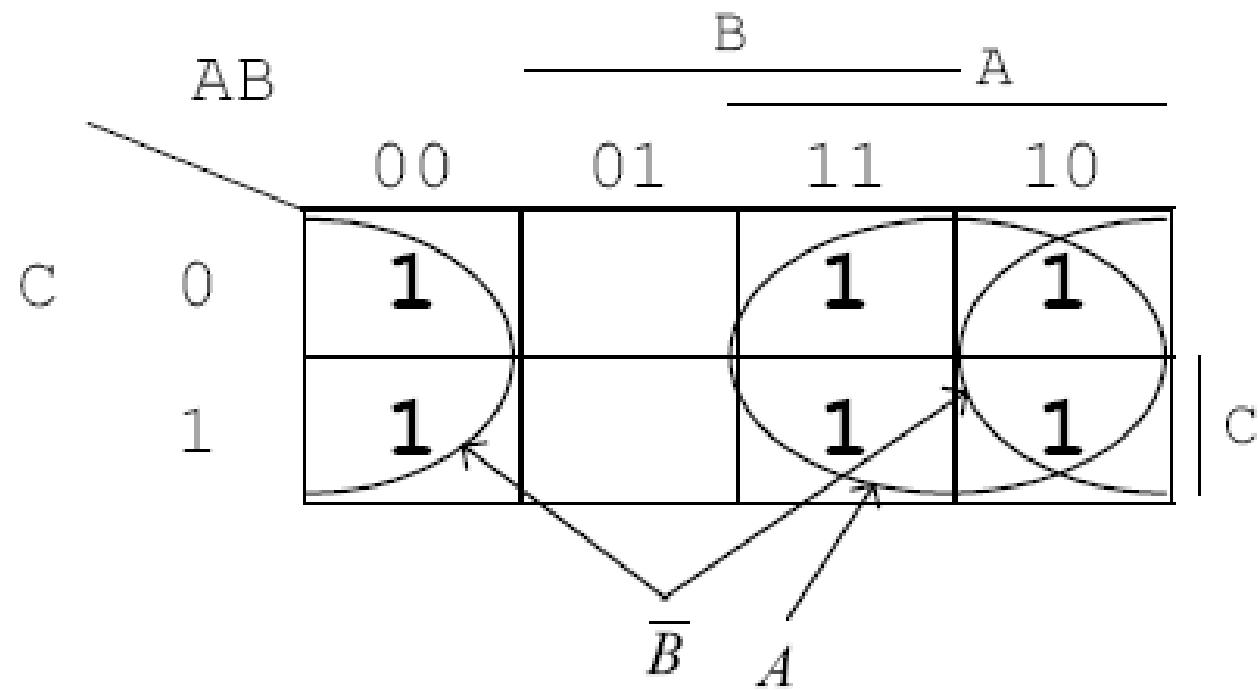
ABCD								
0000	0						A+C	
0001	0						A'+C'	
0010	1							
0011	1							
0100	0							
0101	0							
0110	1							
0111	1							
1000	1							
1001	1							
1010	0							
1011	0							
1100	1							
1101	1							
1110	0							
1111	0							

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

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

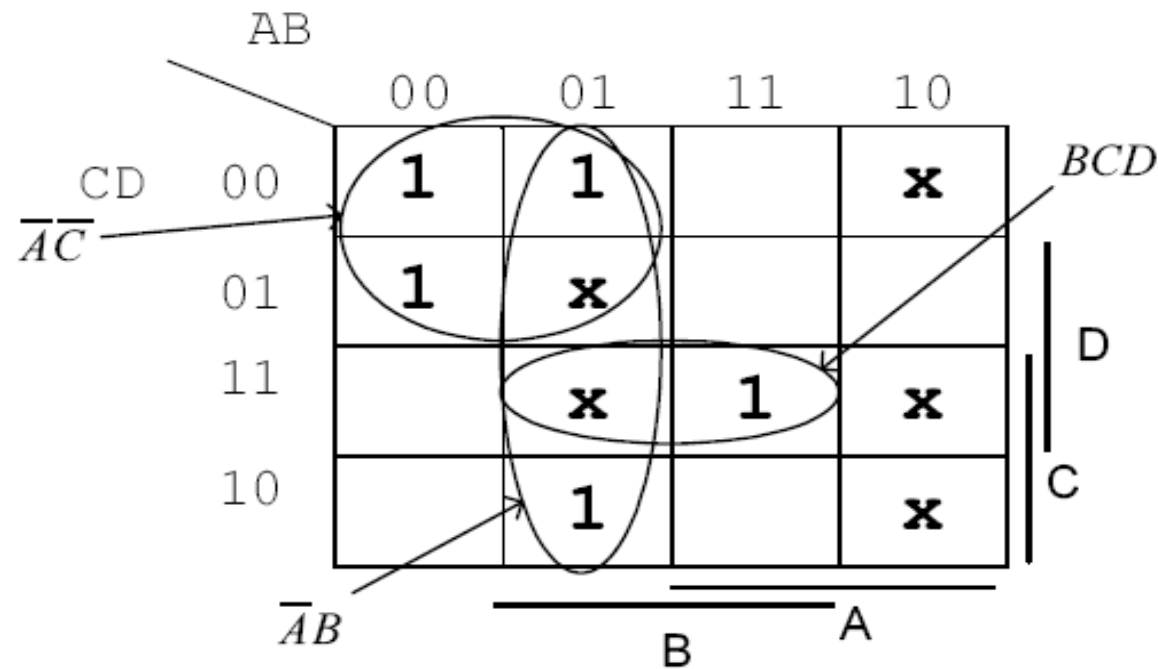
		BC			
A		00	01	11	10
0	0	0	0	0	
1	0	1	*	*	

$$L5 = AC$$

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

Pomoću K-tablice minimizirati funkciju

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



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