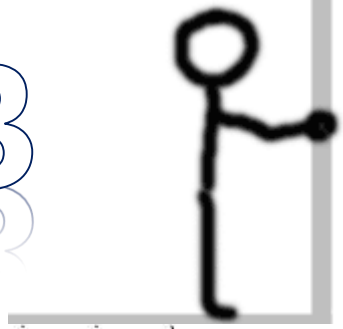
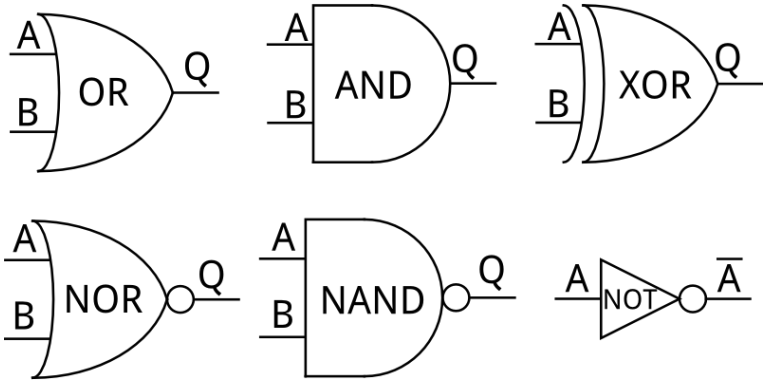
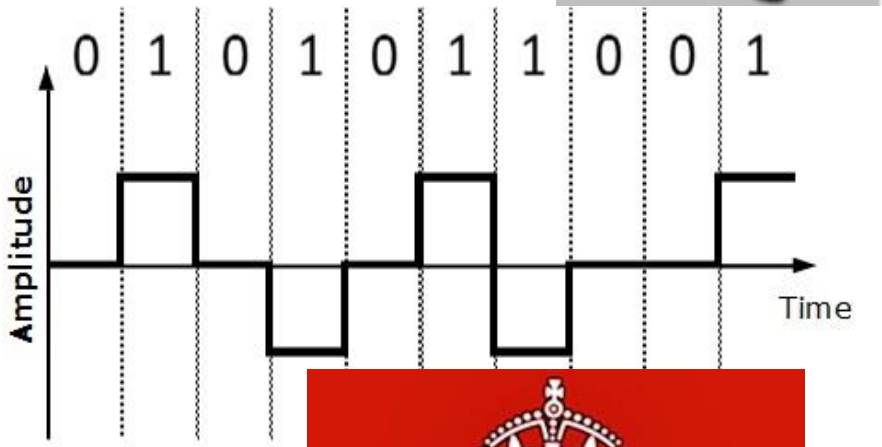
Proiectare Logica

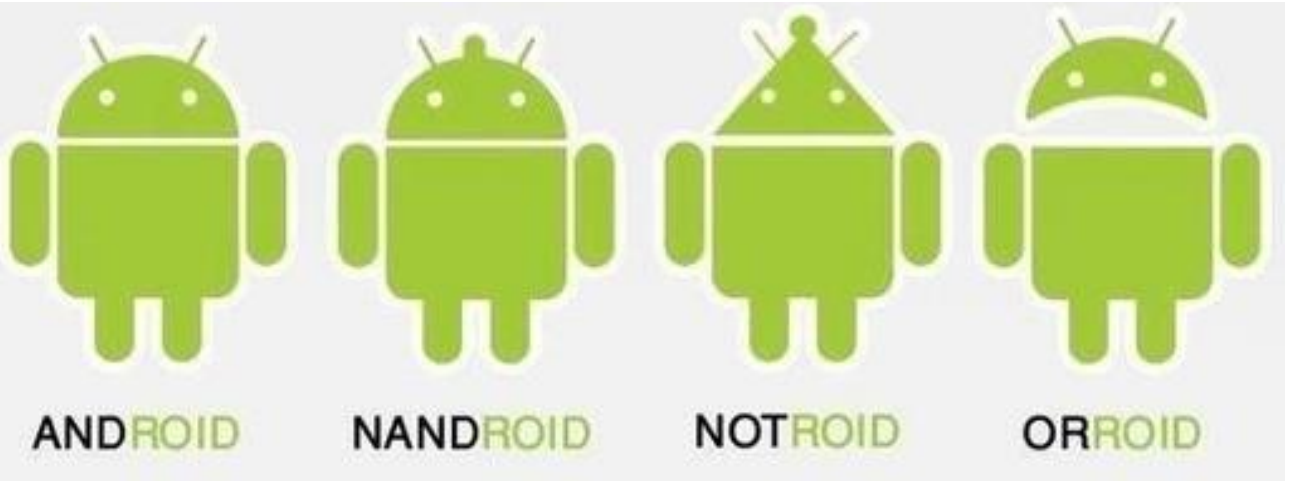
Digital Logic Design

Lab 03





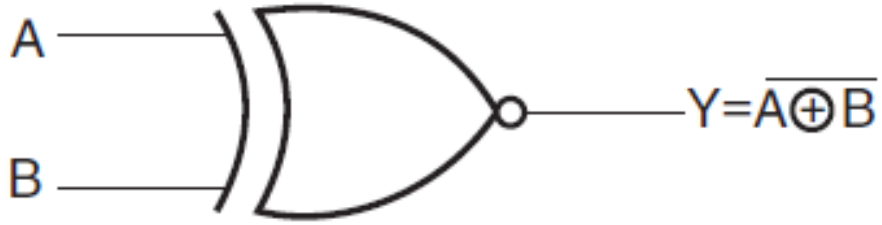




Verificarea identitatilor

Folosind :

- tabele de adevar
- diagrame Venn
- wronex si poarta XNOR (coincidenta)
- regulile algebrei booleene
- formele canonice : sume de produse; produse de sume



$$Y = (\overline{A \oplus B}) = (A.B + \overline{A}.\overline{B})$$

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

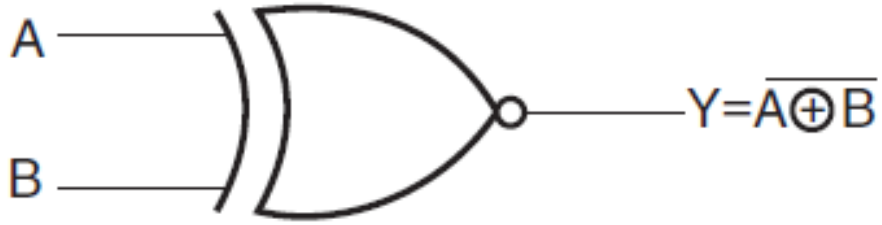
Demonstrati identitatile: tabele adev

- $(A + B)(A + C) = A + BC$
- $\boldsymbol{A \oplus B = A'B + AB'}$
- $\boldsymbol{(A \oplus B)' = AB + A'B'}$
- $\boldsymbol{A \oplus B \oplus AB = A + B}$
- $\boldsymbol{A(B \oplus C) = AB \oplus AC}$

XOR ≡ Suma mod 2

A B	O
0 0	0
0 1	1
1 0	1
1 1	0

Poarta XNOR ≡ Coincidenta



$$Y = (\overline{A \oplus B}) = (A.B + \overline{A}.\overline{B})$$

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

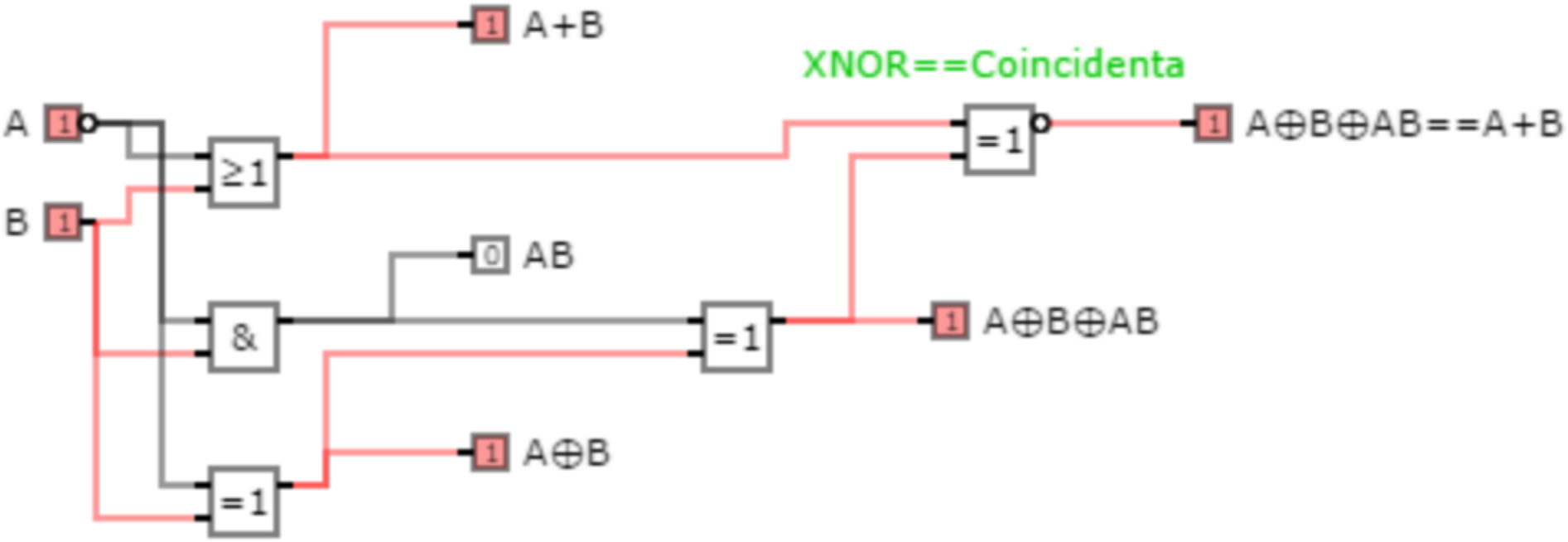
Verificati identitatile folosind tabele de adevar

1. $(A + B)(A + C) = A + BC$
2. $A \oplus B = A'B + AB'$
3. $(A \oplus B)' = AB + A'B'$
4. $A \oplus B \oplus AB = A + B$
5. $A(B \oplus C) = AB \oplus AC$
6. $(A \oplus B)' = (A' + B) \cdot (A + B')$

Verificarea identitatii

$$A \oplus B \oplus AB = A + B$$

folosind wronex



Demonstrati folosind wronex

- $\boldsymbol{A \oplus B = \bar{A}B + A\bar{B}}$.
- $\boldsymbol{(A \oplus B)' = AB + A'B'}$

Forme canonice: exemplu

- Fie functia *f* definita de tabelul:

i	A	B	C	*f*	mintermeni (m_i)	Maxtermeni (M_i)
0	0	0	0	**1**	**A'B'C'**	A+B+C
1	0	0	1	**0**	A'B'C	**A+B+C'**
2	0	1	0	**0**	A'BC'	**A+B'+C**
3	0	1	1	**1**	**A'BC**	A+B'+C'
4	1	0	0	**1**	**AB'C'**	A'+B+C
5	1	0	1	**0**	AB'C	**A'+B+C'**
6	1	1	0	**1**	**ABC'**	A'+B'+C
7	1	1	1	**1**	**ABC**	A'+B'+C'

FCD: $f = A'B'C' + A'BC + AB'C' + ABC' + ABC = \sum m(0,3,4,6,7)$

FCD= *F*orma *C*anonica *D*isjunctiva (foloseste operatia disjuntiva "+")

FCC: $f = (A + B + C') \cdot (A + B' + C) \cdot (A' + B + C') = \prod M(1,2,5)$

FCC= *F*orma *C*anonica *C*onjunctiva (foloseste operatia conjunctiva "·")

$f' = A'B'C + A'BC' + AB'C \rightarrow f = (f')' = (A'B'C)'(A'BC')'(AB'C)'$

Tema

- Sa se gaseasca mintermenii si maxtermenii functiei

i	A	B	C	f	mintermeni (m_i)	Maxtermeni (M_i)
0	0	0	0	**0**	A'B'C'	A+B+C
1	0	0	1	**1**	A'B'C	A+B+C'
2	0	1	0	**0**	A'BC'	A+B'+C
3	0	1	1	**0**	A'BC	A+B'+C'
4	1	0	0	**1**	AB'C'	A'+B+C
5	1	0	1	**1**	AB'C	A'+B+C'
6	1	1	0	**1**	ABC'	A'+B'+C
7	1	1	1	**0**	ABC	A'+B'+C'

FCC si FCD

- Scrieti FCD si FCC pentru functiile si precizati mintermenii si maxtermenii.

Tabela de adevar

A	B	C	F (ABC)
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Tabela de adevar

A	B	C	F (ABC)
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

- 01101101; 10010101; 11111011; etc

Diagrame Venn

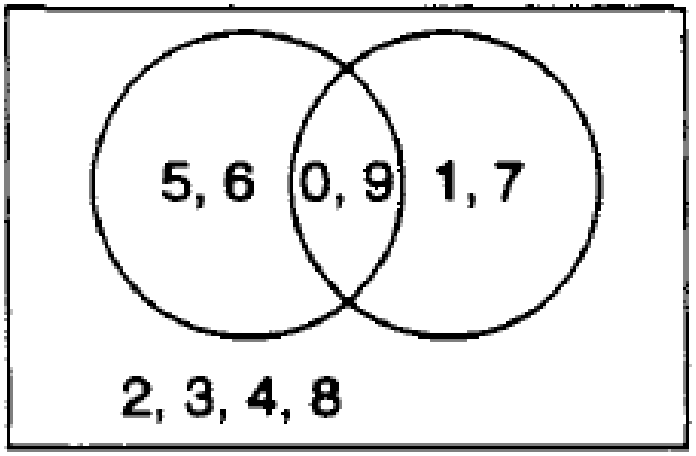


Diagrama in teoria multimilor

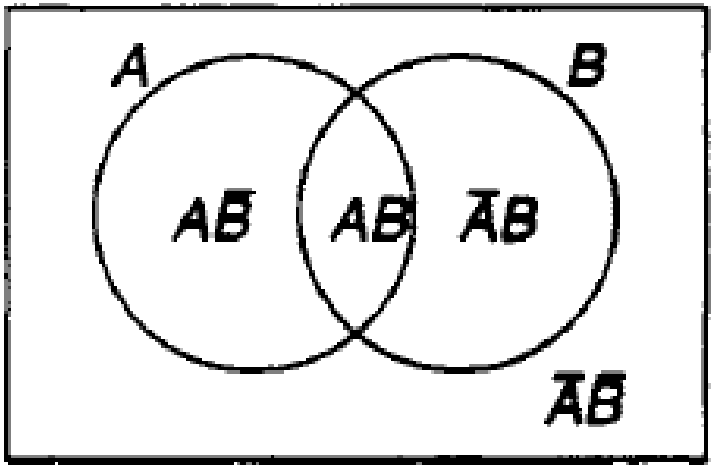
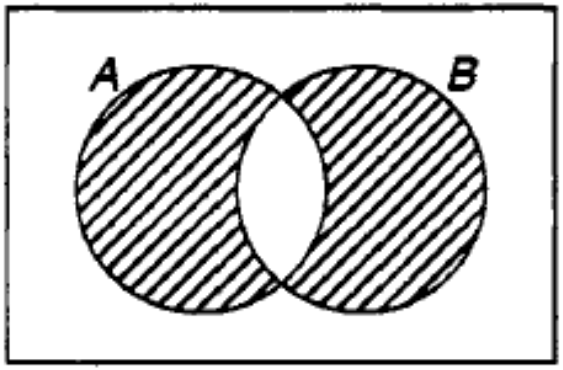
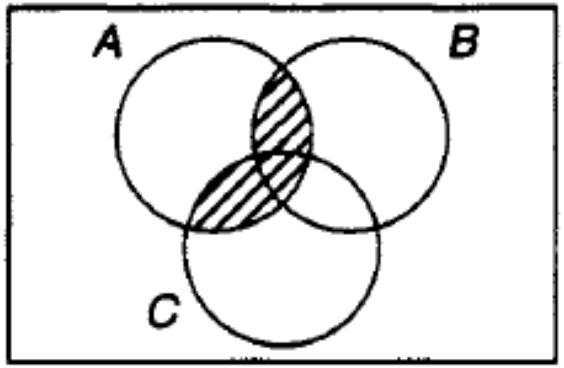


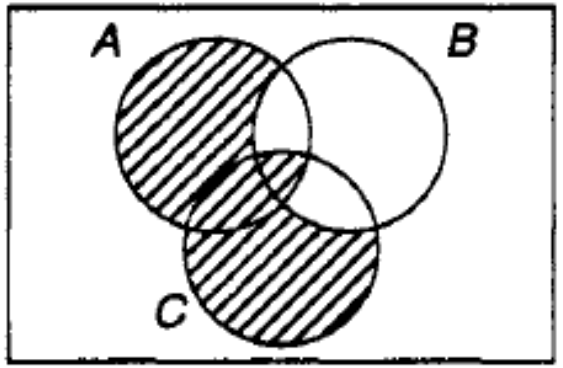
Diagrama Venn



$A\bar{B}+\bar{A}B$



$AB+AC$



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

Diagrame Venn: reprezentari canonice

- 2 variabile

$f(A,B)$	$\overline{A}$	A
$\overline{B}$	$\overline{A}\overline{B}$	$A\overline{B}$
B	$\overline{A}B$	AB

$A \oplus B$	$A=0$	$A=1$
$B=0$	0	1
$B=1$	1	0

$$f(A,B) = A \oplus B = A\overline{B} + \overline{A}B$$

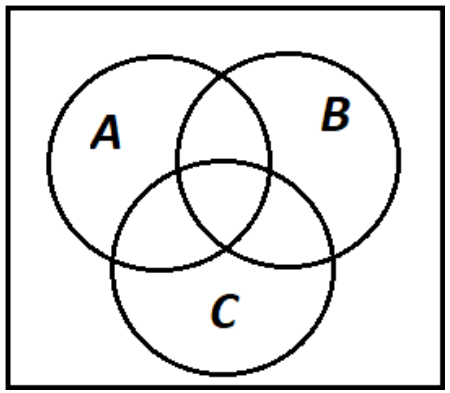
A	B	O
0	0	0
0	1	1
1	0	1
1	1	0

Diagrame Veitch asociate

- 3 variabile

$f(A,B,C)$	$\overline{A}\overline{B}$	$\overline{A}B$	AB	$A\overline{B}$
$\overline{C}$	$\overline{A}\overline{B}\overline{C}$	$\overline{A}B\overline{C}$	$AB\overline{C}$	$A\overline{B}\overline{C}$
C	$\overline{A}\overline{B}C$	$\overline{A}BC$	ABC	$A\overline{B}C$

$\overline{A}$ A $\overline{C}$ C $\overline{B}$ B $\overline{B}$



Diagrame Venn - Veitch

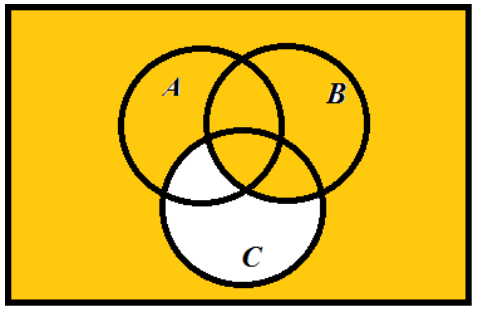
- 3 variabile

$f(A,B,C)$	$\overline{A}\overline{B}$	$\overline{A}B$	AB	$A\overline{B}$
$\overline{C}$	$\overline{A}\overline{B}\overline{C}$	$\overline{A}B\overline{C}$	$AB\overline{C}$	$A\overline{B}\overline{C}$
C	$\overline{A}\overline{B}C$	$\overline{A}BC$	ABC	$A\overline{B}C$

$\overline{A}$ A $\overline{C}$ C $\overline{B}$ B $\overline{B}$

Diagrama Veitch

$f(A,B,C)$	$\overline{A}\overline{B}$	$\overline{A}B$	AB	$A\overline{B}$
$\overline{C}$	1	1	1	1
C	0	1	1	0

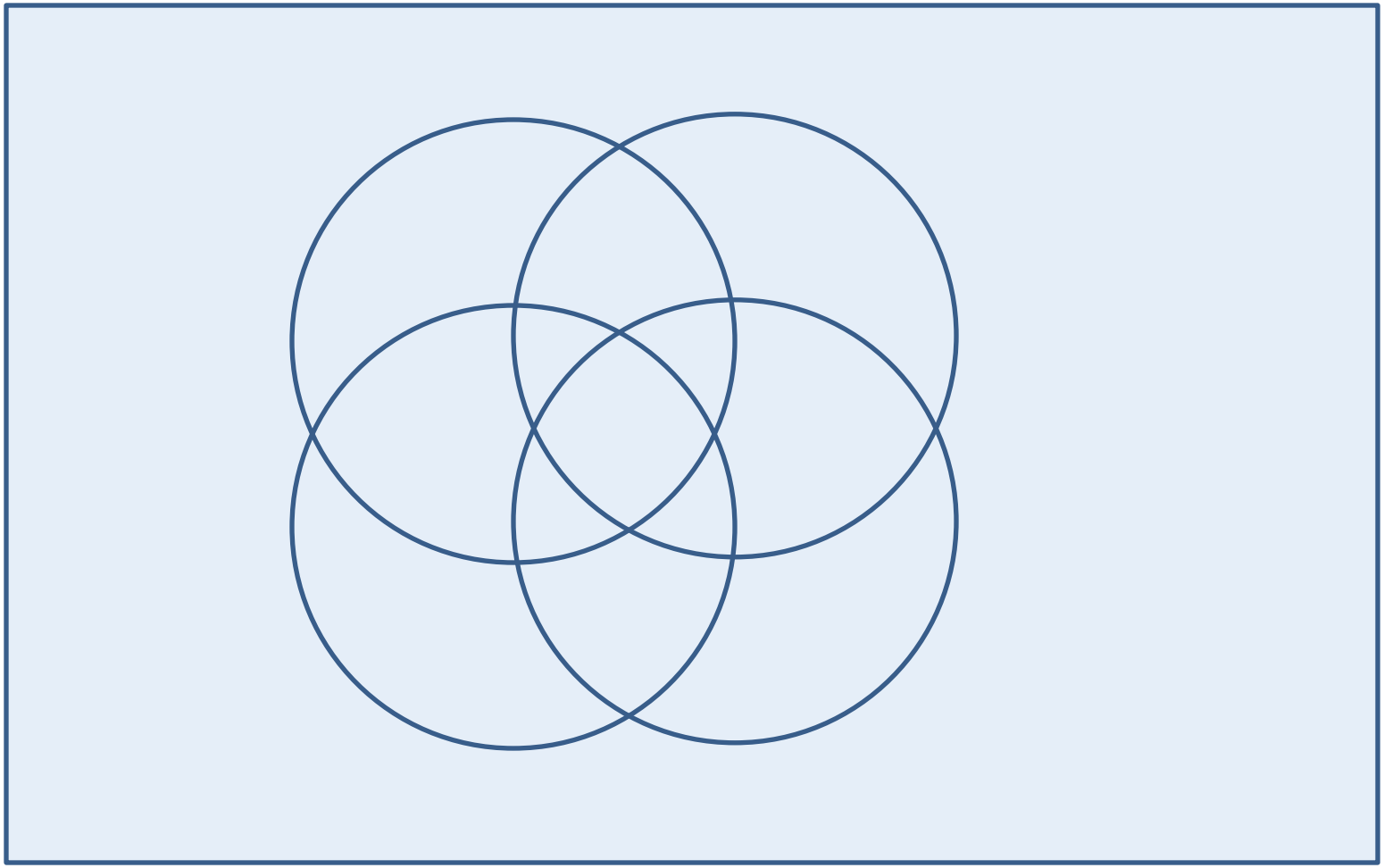


$$f(A,B,C) = B + \overline{C}$$

Diagrama Venn

Diagrama Venn de 4 variabile

- Este corecta diagrama Venn de mai jos?



- Cate multimi disjuncte are aceasta diagrama?

Diagrame Veitch: reprezentari canonice

- 4 variabile

$f(A,B,C,D)$	$\bar{A}\bar{B}$	$\bar{A}B$	AB	$A\bar{B}$
$\bar{C}\bar{D}$	$\bar{A}\bar{B}\bar{C}\bar{D}$	$\bar{A}B\bar{C}\bar{D}$	$AB\bar{C}\bar{D}$	$A\bar{B}\bar{C}\bar{D}$
$\bar{C}D$	$\bar{A}\bar{B}\bar{C}D$	$\bar{A}B\bar{C}D$	$AB\bar{C}D$	$A\bar{B}\bar{C}D$
CD	$\bar{A}\bar{B}CD$	$\bar{A}BCD$	$ABCD$	$A\bar{B}CD$
$C\bar{D}$	$\bar{A}\bar{B}C\bar{D}$	$\bar{A}BC\bar{D}$	$ABC\bar{D}$	$A\bar{B}C\bar{D}$

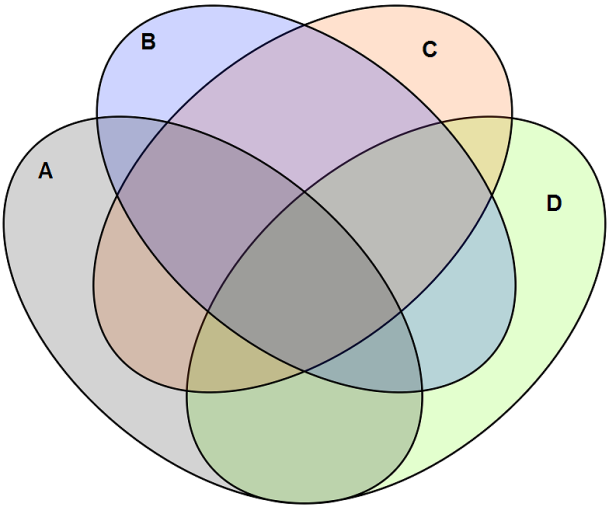


Diagrama Venn Corecta