Procedimiento:

1.- Realizar la reducción de la siguiente expresión booleana con las propiedades del algebra de Boole, dibujar la solución con simbología y una vez que tengas la solución comprobar con tablas la verdad y también comprobar con un PLD las ecuaciones resultantes.

Ej. Solución

$F(A,B,C,D) = AB + A'D' + BD' + A'B + CD'A + A'D + CD + A'B'C' = B + A' + C$

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

1.

$$\overline{XYZ} + \bar{Y}(XZ + X\bar{Z})$$

Solución:

$\overline{ABC} + \bar{B}(AC + A\bar{C}) = \bar{B}[A(C + \bar{C})] = \overline{ABC} + \bar{B}A = \bar{A} + \bar{B} + \bar{C} + \bar{B}A = \bar{A} + \bar{B} + \bar{C}$

A	B	C	OUTPUT
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

```
entity Prog1 is
    Port ( a : in  STD_LOGIC;
           b : in  STD_LOGIC;
           c : in  STD_LOGIC;
           d : in  STD_LOGIC;
           x : out  STD_LOGIC;
           y : out  STD_LOGIC);
end Prog1;

architecture Behavioral of Prog1 is

begin
x <=(a and b and c)not or (b not) and
(a not and c or a and c not);
y<= (a not) or (b not) or (c not);
end Behavioral;
```

entity Progl is
Port (
a : in STD_LOGIC;
b: in STD_LOGIC; :
c: in STD_LOGIC;
d: in STD__LOGIC;
x : out STD_LOGIC;
Y : out STD_LOGIC);
end Progl; .

architecture Behavioral of Prog1 is
begin x <= (a and b and c) not or (b not) and (a not and c a and c not);
Y<= (a not) or ((b not) or (c not);
end Behavioral ;

$$\overline{(Z+\overline{\bar{X}Y})(\overline{Y+\omega})}$$

$$\overline{[C+\overline{\bar{A}B}][B+D]} = \overline{[C+\bar{\bar{A}}+\bar{B}]} + \overline{[\overline{B+D}]} = \overline{[C+A+\bar{B}]} + [B+D] =$$
$$= \left[\bar{C}\cdot\bar{A}\cdot\bar{\bar{B}}\right] + [B+D] = \bar{C}\bar{A}B + B + D = \boldsymbol{B} + \boldsymbol{D}$$

A	B	C	D	OUT
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1

1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

```
entity Prog2 is
Port (a : in STD_LOGIC;
b : in STD_LOGIC;
c: in STD_LOGIC;
d :  in STD_LOGIC;
X : out STD_LOGIC;
y : out STD_LOGIC);
end Prog2;
architecture Behavioral of Prog2 is
begin
x<= ((c or a not and b) and (b or d) not) not;
Y<= b or d;
end Behavioral;
```

3.

$$(\overline{\overline{X+Y}+Yzw})\overline{XY}$$

$\overline{(\overline{A+B}+BCD)}\overline{AB} = [\overline{\overline{A+B}\cdot\overline{BCD}}][\overline{A+B}] = [A\bar{B}+A\bar{C}+A\bar{D}+B\bar{C}+B\bar{D}][\bar{A}+\bar{B}] =$
$\bar{A}B\bar{C}+\bar{A}B\bar{D}+A\bar{B}+A\bar{C}\bar{B}+A\bar{D}\bar{B} = \bar{A}B\bar{C}+\bar{A}B\bar{D}+A\bar{B}+A\bar{D}\bar{B} = \bar{A}B\bar{C}+\bar{A}B\bar{D}+A\bar{B}$
$= \bar{A}B[\bar{C}+\bar{D}]+A\bar{B}$

A	B	C	D	OUT
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0

A	B	C	D	OUT
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0

1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

entity Prog3 isPort (a : inb : in.ind : in0 0 0 0 0STD_LOGIC;STD LOGIC;STD_LOGIC;STD LOGICHSTD_LOGIC;STD_LOGIC);x:o uty : outend Prog3;architecture Behavioral of Prog3 isbeginx<= (((a or b) not or b and b and c and d)) notand (a and b) not;y<= a not and b and (c not or d not) or a and b not;and Behavioral.

Circuito 74LS21(AND 4 ENTRADAS)

X	Y	Z	W	SALIDA
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0

Circuito 74LS00(NAND)

X	Y	SALIDA
0	0	1
0	1	1
1	0	1
1	1	0

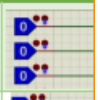
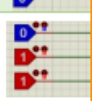
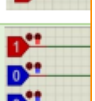
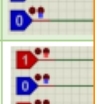
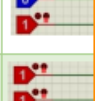
Circuito 74L04(NOT)

X	SALIDA
0	1
1	0

Circuito 74L86(XOR)

X	Y	SALIDA
0	0	0
0	1	1
1	0	1
1	1	0

Circuito 74L10(NAND 3

X	Y	Z	SALIDA	SI
0	0	0	1	
0	0	1	1	
0	1	0	1	
0	1	1	1	
1	0	0	1	
1	0	1	1	
1	1	0	1	
1	1	1	0	

2) $\overline{(Z + \overline{XY})(Y + W)}$

$\overline{[C + \overline{AB}][B + D]} = \overline{[C + \bar{A} + \bar{B}]} + \overline{[B + D]} =$

$[C + A + \bar{B}] + [B + D] = [\bar{C} \cdot \bar{A} \cdot \bar{B}] + [B + D] =$

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

3) $\overline{(\overline{X+Y} + YZW)}\,\overline{XY}$

$\overline{(\overline{A + B} + BCD)}\,\overline{AB} = [\overline{\bar{A}+B} \cdot \overline{BCD}][\bar{A} + \bar{B}]$

$[A + B \cdot [\bar{B} + \bar{C} + \bar{D}]][\bar{A} + \bar{B}] =$

$[A\bar{B} + A\bar{C} + A\bar{D} + B\bar{B} + B\bar{C} + B\bar{D}][\bar{A} + \bar{B}]$

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

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

$= \bar{A}BC + \bar{A}B\bar{D} + A\bar{B} + A\bar{D}\bar{B}$

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

$\bar{A}B[\bar{C} \cdot \bar{D}] + A\bar{B}$

7410 NAND — 3 in 1 out

A B C	r	s	t	u	z	x	T	$\bar{A} + \bar{B} + \bar{C}$
0 0 0	0	1	0	0	0	0	1	1
0 0 1	0	1	0	0	0	0	1	1
0 1 0	0	1	0	0	0	0	1	1
0 1 1	0	1	0	0	0	0	1	1
1 0 0	0	1	0	1	1	1	1	1
1 0 1	0	1	1	0	1	1	1	1
1 1 0	0	1	0	1	1	0	1	1
1 1 1	1	0	1	0	1	0	0	0

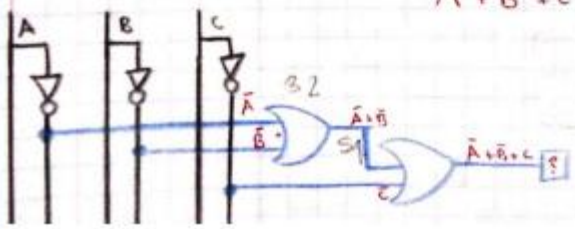
$\overline{ABC} + \bar{B}(\overset{z}{AC} + A\bar{C})$ ①

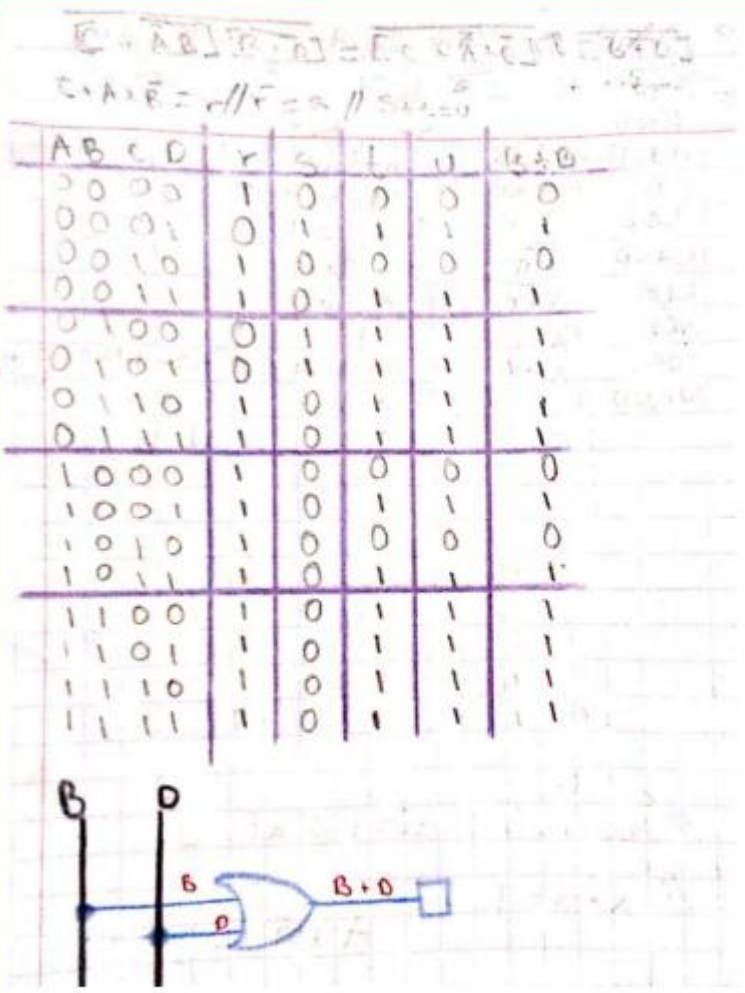
$ABC = r$ // $\overline{ABC} = s$ // $AC = t$ // $A\bar{C} = u$

$AC + A\bar{C} = z = t + u$

$\bar{B} \cdot z = x$ // $x + s = T$

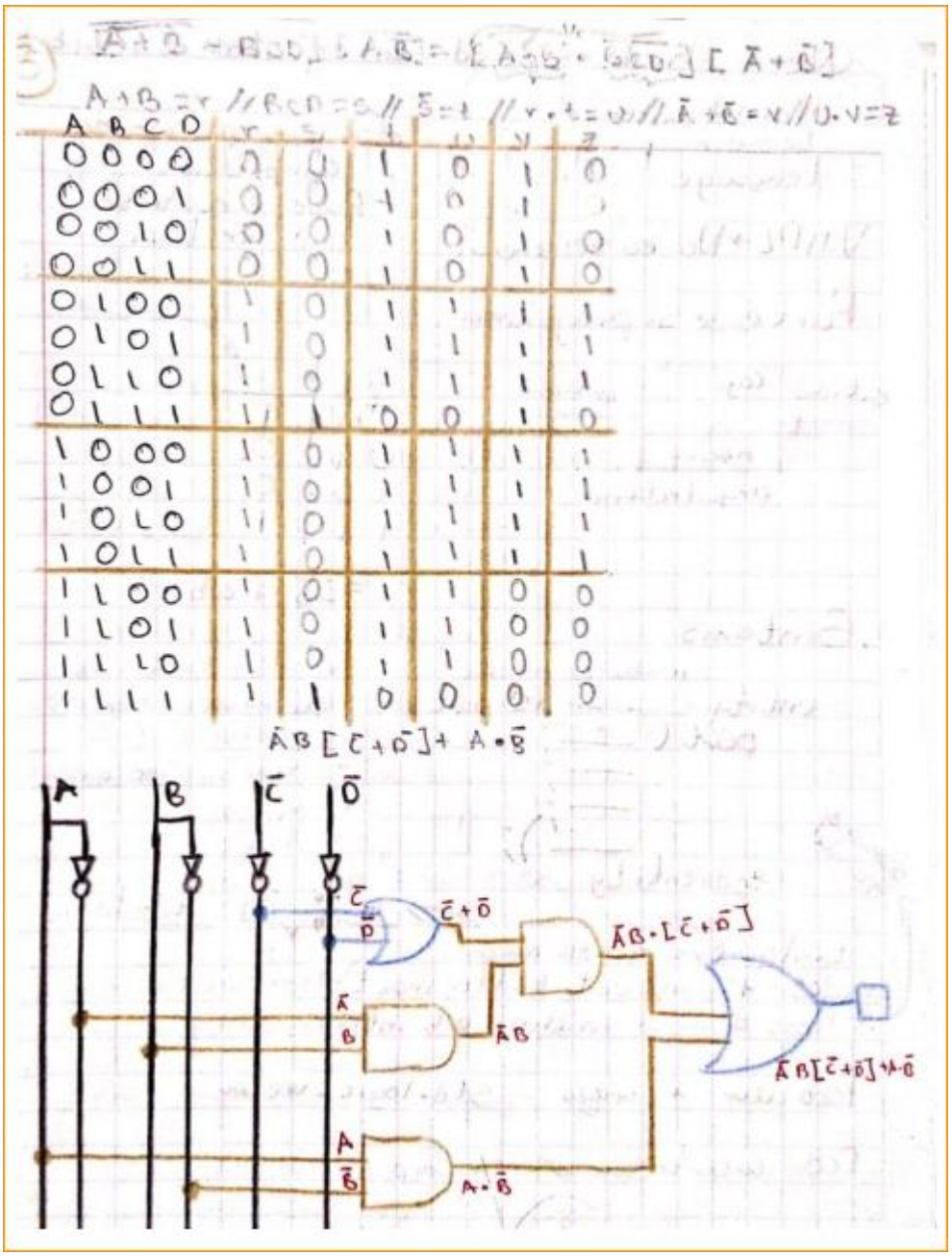
$\bar{A} + \bar{B} + \bar{C}$





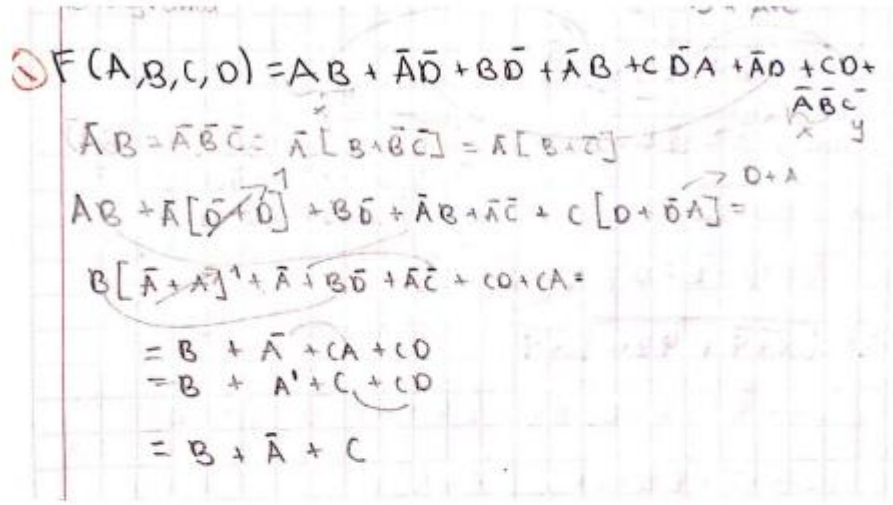
Su comprobación fue realizada con una tabla de verdad

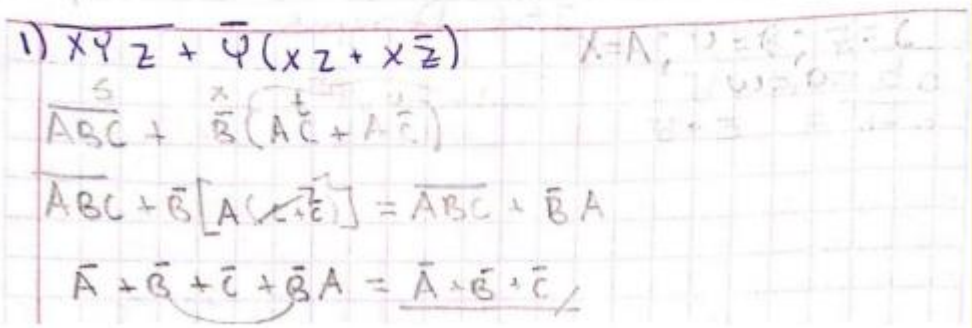
Se realizaros los diagramas correspondientes de sus reducciones


A B C D
$\bar{A}B[\bar{C}+\bar{D}]+A\cdot\bar{B}$
A
B
$\bar{C}$
$\bar{D}$
$\bar{C}+\bar{D}$
$\bar{A}B\cdot[\bar{C}+\bar{D}]$
$\bar{A}$
B
$\bar{A}B$
A
$\bar{B}$
$A\cdot\bar{B}$
$\bar{A}B[\bar{C}+\bar{D}]+A\cdot\bar{B}$

4.- Documentar la practica con comentarios de cada una de las operaciones.

Operaciones del ejercicio 2





Las expresiones algebraicas se redujeron con ayuda del álgebra de Boole

Map

	$\overline{C}.\overline{D}$	$\overline{C}.D$	$C.D$	$C.\overline{D}$
$\overline{A}.\overline{B}$	1	1	1	1
$\overline{A}.B$	0	1	1	1
$A.B$	0	0	1	0
$A.\overline{B}$	0	1	1	1

Map Layout

	$\overline{C}.\overline{D}$	$\overline{C}.D$	$C.D$	$C.\overline{D}$
$\overline{A}.\overline{B}$	0	1	3	2
$\overline{A}.B$	4	5	7	6
$A.B$	12	13	15	14
$A.\overline{B}$	8	9	11	10

Salida E-O:

Groups

(0,1,2,3)	$\overline{A}.\overline{B}$
(1,3,5,7)	$\overline{A}.D$
(1,3,9,11)	$\overline{B}.D$
(2,3,6,7)	$\overline{A}.C$
(2,3,10,11)	$\overline{B}.C$
(3,7,11,15)	$C.D$

$y = A'B' + A'D + B'D + A'C + B'C + CD$

TABLA DE VERDAD

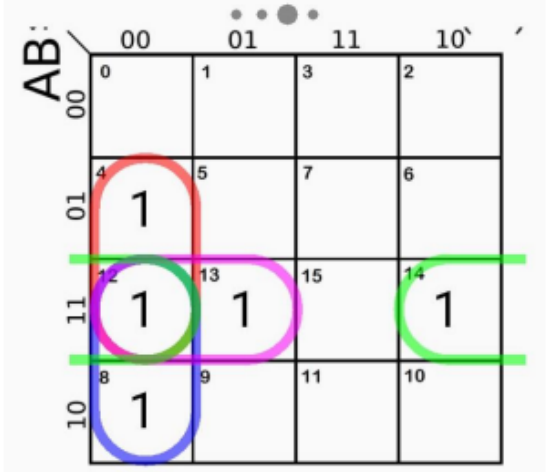
A	B	C	D	S1=E-O	S2=N-S
0	0	0	0	1	0
0	0	0	1	1	0
0	0	1	0	1	0
0	0	1	1	1	0
0	1	0	0	0	1
0	1	0	1	1	0
0	1	1	0	1	0
0	1	1	1	1	0
1	0	0	0	0	1
1	0	0	1	1	0
1	0	1	0	1	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	0	1	0	1
1	1	1	0	0	1
1	1	1	1	1	0

Map

	$\overline{C}.\overline{D}$	$\overline{C}.D$	$C.D$	$C.\overline{D}$
$\overline{A}.\overline{B}$	0	0	0	0
$\overline{A}.B$	1	0	0	0
$A.B$	1	1	0	1
$A.\overline{B}$	1	0	0	0

Map Layout

	$\overline{C}.\overline{D}$	$\overline{C}.D$	$C.D$	$C.\overline{D}$
$\overline{A}.\overline{B}$	0	1	3	2
$\overline{A}.B$	4	5	7	6
$A.B$	12	13	15	14
$A.\overline{B}$	8	9	11	10



Seleccionar respuesta

S = $B\bar{C}\bar{D}$ + $A\bar{C}\bar{D}$ + $AB\bar{C}$ + $AB\bar{D}$

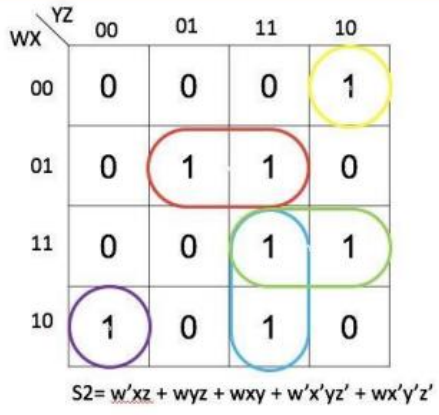
SALIDA N-S:

Groups

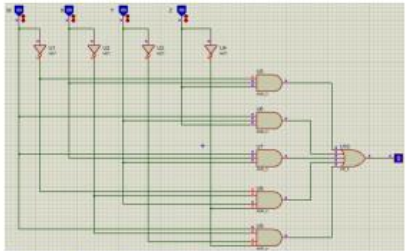
(4,12)	$B.\overline{C}.\overline{D}$
(8,12)	$A.\overline{C}.\overline{D}$
(12,13)	$A.B.\overline{C}$
(12,14)	$A.B.\overline{D}$

y = BC'D' + AC'D' + ABC' + ABD

W	X	Y	Z	SI=E-O
0	0	0	0	0
0	0	0	I	0
0	0	I	0	I
0	0	I	I	0
0	I	0	0	0
0	I	0	I	I
0	I	I	0	0
0	I	I	I	I
I	0	0	0	I
I	0	0	I	0
I	0	I	0	0
I	0	I	I	I
I	I	0	0	0
I	I	0	I	0
I	I	I	0	I
I	I	I	I	I



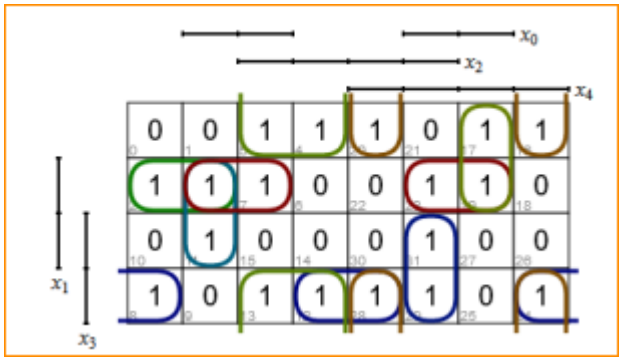
S2= w'xz + wyz + wxy + w'x'yz' + wx'y'z'



COMBINACION:

0 0 0 0

No	A	B	C	D	E	F
0	0	0	0	0	0	0
1	0	0	0	0	1	0
2	0	0	0	1	0	1
3	0	0	0	1	1	1
4	0	0	1	0	0	1
5	0	0	1	0	1	1
6	0	0	1	1	0	0
7	0	0	1	1	1	1
8	0	1	0	0	0	1
9	0	1	0	0	1	0
10	0	1	0	1	0	0
11	0	1	0	1	1	1
12	0	1	1	0	0	1
13	0	1	1	0	1	1
14	0	1	1	1	0	0
15	0	1	1	1	1	0
16	1	0	0	0	0	1
17	1	0	0	0	1	1
18	1	0	0	1	0	0
19	1	0	0	1	1	1
20	1	0	1	0	0	1
21	1	0	1	0	1	0
22	1	0	1	1	0	0
23	1	0	1	1	1	1
24	1	1	0	0	0	1
25	1	1	0	0	1	0
26	1	1	0	1	0	0
27	1	1	0	1	1	0
28	1	1	1	0	0	1
29	1	1	1	0	1	1
30	1	1	1	1	0	0
31	1	1	1	1	1	1



MAPA DE KARNAUGH

Map

	$\overline{D}\overline{E}$	$\overline{D}E$	DE	$D\overline{E}$
$\overline{A}\overline{B}\overline{C}$	0	0	1	1
$\overline{A}\overline{B}C$	1	1	1	0
$\overline{A}BC$	1	1	0	0
$\overline{A}B\overline{C}$	1	0	1	0
$A\overline{B}\overline{C}$	1	1	1	0
$A\overline{B}C$	1	0	1	0
ABC	1	1	1	0
$AB\overline{C}$	1	0	0	0

Map Layout

	$\overline{D}\overline{E}$	$\overline{D}E$	DE	$D\overline{E}$
$\overline{A}\overline{B}\overline{C}$	0	1	3	2
$\overline{A}\overline{B}C$	4	5	7	6
$\overline{A}BC$	12	13	15	14
$\overline{A}B\overline{C}$	8	9	11	10
$A\overline{B}\overline{C}$	16	17	19	18
$A\overline{B}C$	20	21	23	22
ABC	28	29	31	30
$AB\overline{C}$	24	25	27	26

Groups

(4,12,20,28)	$C\overline{D}\overline{E}$
(3,7,19,23)	$\overline{B}DE$
(8,12,24,28)	$B\overline{D}\overline{E}$
(4,5,12,13)	$\overline{A}C\overline{D}$
(2,3)	$\overline{A}B\overline{C}D$
(29,31)	$ABCE$
(3,11)	$\overline{A}\overline{C}DE$
(16,17)	$A\overline{B}\overline{C}D$

y = CD'E' + B'DE + BD'E' + A'CD' + A'B'C'D + ABCE + A'C'DE + AB'C'D'

No.	A	B	C	D	E	Z
0	0	0	0	0	0	1
1	0	0	0	0	1	0
2	0	0	0	1	0	1
3	0	0	0	1	1	0
4	0	0	1	0	0	1
5	0	0	1	0	1	0
6	0	0	1	1	0	1
7	0	0	1	1	1	0
8	0	1	0	0	0	1
9	0	1	0	0	1	0
10	0	1	0	1	0	X
11	0	1	0	1	1	X
12	0	1	1	0	0	X
13	0	1	1	0	1	X
14	0	1	1	1	0	X
15	0	1	1	1	1	X
16	1	0	0	0	0	0
17	1	0	0	0	1	0
18	1	0	0	1	0	0
19	1	0	0	1	1	1
20	1	0	1	0	0	0
21	1	0	1	0	1	0
22	1	0	1	1	0	1
23	1	0	1	1	1	0
24	1	1	0	0	0	0
25	1	1	0	0	1	1
26	1	1	0	1	0	X
27	1	1	0	1	1	X
28	1	1	1	0	0	X
29	1	1	1	0	1	X
30	1	1	1	1	0	X
31	1	1	1	1	1	X

MAPA DE KARNAUGH

Map

	$\overline{D}\overline{E}$	$\overline{D}E$	DE	$D\overline{E}$
$\overline{A}\overline{B}\overline{C}$	1	0	0	1
$\overline{A}\overline{B}C$	1	0	0	1
$\overline{A}BC$	x	x	x	x
$\overline{A}B\overline{C}$	1	0	x	x
$A\overline{B}\overline{C}$	0	0	1	0
$A\overline{B}C$	0	0	0	1
ABC	x	x	x	x
$AB\overline{C}$	0	1	x	x

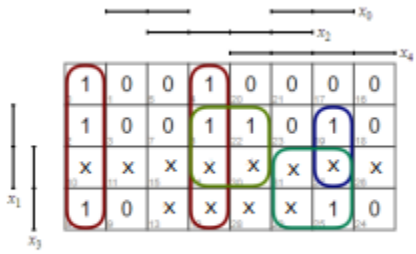
Map Layout

	$\overline{D}\overline{E}$	$\overline{D}E$	DE	$D\overline{E}$
$\overline{A}\overline{B}\overline{C}$	0	1	3	2
$\overline{A}\overline{B}C$	4	5	7	6
$\overline{A}BC$	12	13	15	14
$\overline{A}B\overline{C}$	8	9	11	10
$A\overline{B}\overline{C}$	16	17	19	18
$A\overline{B}C$	20	21	23	22
ABC	28	29	31	30
$AB\overline{C}$	24	25	27	26

Groups

(0,2,4,6,8,10,12,14)	$\overline{A}\overline{E}$
(6,14,22,30)	$C\overline{D}\overline{E}$
(25,27,29,31)	$AB\overline{E}$
(19,27)	$A\overline{C}DE$

y = A'E' + CDE' + ABE + AC'DE



$$Z = \overline{A}\overline{E} + C\overline{D}\overline{E} + ABE + A\overline{C}DE$$

TABLA DE VERDAD

No.	A	B	C	D	Z
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	1
3	0	0	1	1	0
4	0	1	0	0	1
5	0	1	0	1	0
6	0	1	1	0	0
7	0	1	1	1	0
8	1	0	0	0	1
9	1	0	0	1	0
10	1	0	1	0	X
11	1	0	1	1	X
12	1	1	0	0	X
13	1	1	0	1	X
14	1	1	1	0	X
15	1	1	1	1	X

Map

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	0	1
$\bar{A}B$	1	0	0	0
AB	x	x	x	x
$A\bar{B}$	1	0	x	x

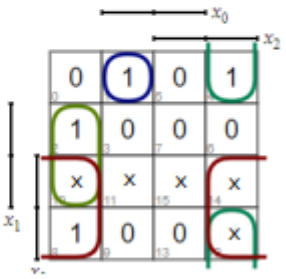
Map Layout

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	3	2
$\bar{A}B$	4	5	7	6
AB	12	13	15	14
$A\bar{B}$	8	9	11	10

Groups

(8,10,12,14)	$A\bar{D}$
(2,10)	$\bar{B}C\bar{D}$
(4,12)	$B\bar{C}\bar{D}$
(1)	$\bar{A}\bar{B}\bar{C}D$

$y = AD' + B'CD' + BC'D' + A'B'C'D$



$$z = A\bar{D} + \bar{B}C\bar{D} + B\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D$$