

Atividade 2 - Sistemas Digitais

1 - Utilizando mapa de Karnaugh encontre a função booleana minimizada para a seguinte tabela verdade.

a	b	y
0	0	1
0	1	0
1	0	1
1	1	0

1º

a\b	0	1
0	1	0
1	1	0

-> a=0, b=0

y = \overline{b}

2 - Utilizando mapa de Karnaugh encontre a função booleana minimizada para a seguinte tabela verdade.

a b c d	y
0000	1
0001	0
0010	1
0011	0
0100	1
0101	1
0110	0
0111	0
1000	0
1001	1
1010	1
1011	1
1100	0
1101	0
1110	1
1111	1

2º

ab\cd	00	01	11	10
00	1 ¹	0	0	1 ³
01	1 ¹	1 ²	0	0
11	0	0	1	1 ⁴
10	0	1 ³	1	1

1 -> a=0 b=0 c=0 d=0

$\overline{a}\overline{c}\overline{d}$

2 -> a=0 b=1 c=0 d=0

$\overline{a}b\overline{c}$

3 -> a=0 b=0 c=1 d=0

$\overline{a}\overline{b}c$

4 -> a=1 b=0 c=1 d=0

$a\overline{b}c$

5 -> a=1 b=0 c=1 d=1

$a\overline{b}cd$

y = $\overline{a}\overline{c}\overline{d} + \overline{a}b\overline{c} + \overline{a}\overline{b}c + a\overline{b}c + a\overline{b}cd$

3 - Utilizando mapa de Karnaugh encontre a função booleana minimizada para as seguintes tabelas da verdade.

a)

A	B	C	S
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

b)

A	B	C	S
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

c)

A	B	C	S
0	0	0	1
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

3º

a)

a\b\c	0	1
00	0	1
01	0	1
11	1	0
10	1	1

1 → a=0 b=0 c=1
 $\bar{A}\bar{C}$
2 → a=1 b=0 c=0
 $A\bar{C}$
3 → a=1 b=0 c=0
 $A\bar{B}$

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

b)

a\b\c	0	1
00	1	0
01	1	0
11	1	0
10	1	1

1 → a=0 b=0 c=0
 \bar{C}
2 → a=1 b=0 c=0
 $A\bar{B}$

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

c)

a\b\c	0	1
00	1	1
01	1	0
11	1	1
10	0	1

1 → a=0 b=0 c=0
 $\bar{A}\bar{B}$
2 → a=0 b=0 c=0
 $\bar{A}\bar{C}$
3 → a=1 b=1 c=0
 AB
4 → a=1 b=0 c=1
 AC

$y = \bar{A}\bar{B} + \bar{A}\bar{C} + AB + AC$

4 – Utilizando os conceitos de regras, leis, postulados e teoremas, simplifique as expressões a seguir.

a) $z = ABC + AB\bar{C} + A\bar{B}C$.

Handwritten simplification of the expression $z = ABC + AB\bar{C} + A\bar{B}C$. The steps are as follows:

$$\begin{aligned} & \text{1a) } ABC + AB\bar{C} + A\bar{B}C \\ & z = A(B \cdot C + B\bar{C} + \bar{B}C) \\ & z = A(B(C + \bar{C}) + \bar{B} \cdot C) \\ & z = A(B \cdot 1 + \bar{B} \cdot C) \\ & z = A(B + \bar{B} \cdot C) \\ & z = A(1 \cdot C) \\ & z = A(C) \\ & z = AC \end{aligned}$$

b) $z = \bar{A}C(\overline{ABD}) + \bar{A}B\bar{C}\bar{D} + A\bar{B}C$.

Handwritten simplification of the expression $z = \bar{A}C(\overline{ABD}) + \bar{A}B\bar{C}\bar{D} + A\bar{B}C$. The steps are as follows:

$$\begin{aligned} & \text{b) } z = \bar{A}C(\overline{ABD}) + \bar{A}B\bar{C}\bar{D} + A\bar{B}C \\ & z = \bar{A}C(\bar{A} + B + D) + \bar{A}B\bar{C}\bar{D} + A\bar{B}C \\ & z = \bar{A}C(\bar{C}(B + D) + \bar{B}\bar{C}\bar{D} + A\bar{B}C) \\ & z = \bar{A}(C \cdot B + D) + \bar{B}\bar{C}\bar{D} + A\bar{B}C \\ & z = \bar{A} \cdot 1 + B\bar{C}\bar{D} + A\bar{B}C \\ & z = \emptyset + B\bar{C}\bar{D} + A\bar{B}C \\ & z = B\bar{B} + C\bar{C} + \bar{D}A \\ & z = \emptyset + \emptyset + A\bar{D} \\ & z = A\bar{D} \end{aligned}$$

c) $x = (\bar{A} + B)(A + B + D)\bar{D}$.

Handwritten simplification of the expression $x = (\bar{A} + B)(A + B + D)\bar{D}$. The steps are as follows:

$$\begin{aligned} & \text{c) } x = (\bar{A} + B)(A + B + D)\bar{D} \\ & x = B(A + B + D)\bar{D} \\ & x = B(1 + 1) \cdot \bar{D} \\ & x = B\bar{D} \end{aligned}$$