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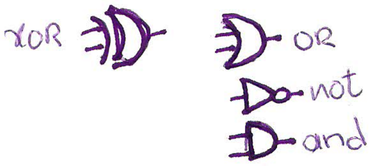
15-09-2011



Tabelas de verdade ⟷ Expressões booleanas

Tabelas de verdade ⟷ Esquemáticos (esquemas lógicos)

Expressões booleanas ⟷ Esquemáticos

$Aparece(A,B) = A \cdot B + \bar{A} \cdot \bar{B}$

A	B	A.B	$\bar{A}$	$\bar{B}$	$\bar{A}.\bar{B}$	$A.B + \bar{A}.\bar{B}$
0	0	0	1	1	1	1
0	1	0	1	0	0	$\boxed{0}$
1	0	0	0	1	0	$\boxed{0}$
1	1	1	0	0	0	1

$F_2 = (A + \bar{B}) \cdot (\bar{A} + B)$

$F_2 = \bar{A} \cdot \bar{B} + A \cdot B$

$x + 0 = x$

$x + 1 = 1$

$x + x = x$

$x + \bar{x} = 1$

$\bar{\bar{x}} = x$

$x \cdot 1 = x$

$x \cdot 0 = 0$

$x \cdot x = x$

$x \cdot \bar{x} = 0$

$x + y = y + x$

$x \cdot y = y \cdot x$

$x + (y + z) = (x + y) + z$

$x \cdot (y \cdot z) = (x \cdot y) \cdot z$

$x \cdot (y + z) = xy + xz$

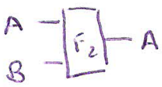
$x + yz = (x + y) \cdot (x + z)$

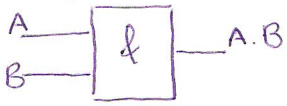
Exemplos:

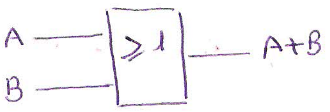
$\overline{x + y} = \bar{x} \cdot \bar{y}$

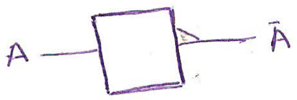
$\overline{x \cdot y} = \bar{x} + \bar{y}$

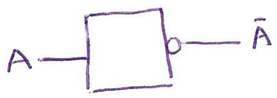
$A + AB = A1 + AB = A(1 + B) = A1 = A$ →











A	B	A.B
0	x	0
1	0	0
1	1	1

A	A.B
0	0
1	B

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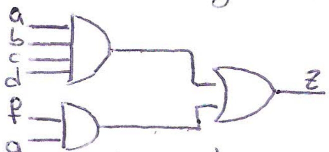
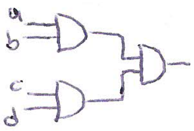
$z = a.b.c.d + f.g$ $\Rightarrow$ $(a.b).(c.d) + f.g$





Para implementar a nível físico, serão necessários módulos de and e OR.

Preocupação:
Gerir stock de módulos
olhar para a expressão e tentar reduzi-la

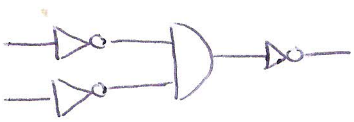
A	B	Z_{AND}	Z_{OR}	Z_{NAND}	Z_{NOR}	Z_{XOR}
0	0	0	0	1	1	0
0	1	0	1	1	0	1
1	0	0	1	1	0	1
1	1	1	1	0	0	0

Não é preciso um stock com todas as funções.

$\overline{a.b} = \bar{a} + \bar{b}$

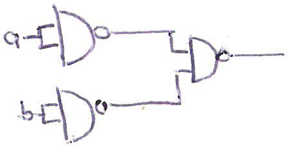
$\overline{a+b} = \bar{a} . \bar{b}$

$a + b = \overline{\overline{a+b}} = \overline{\bar{a} . \bar{b}}$



$\overline{a.a} = \bar{a}$

AND

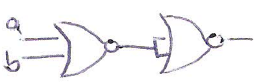


OR

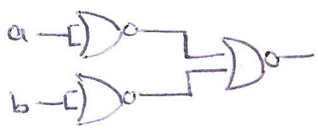
NANDs de 2 entradas são suficientes, ou até mesmo NORs

$\bar{a} = \overline{a+a}$

$a + b = \overline{\overline{a+b}}$



$a . b = \overline{\overline{a.b}} = \overline{\bar{a} + \bar{b}}$



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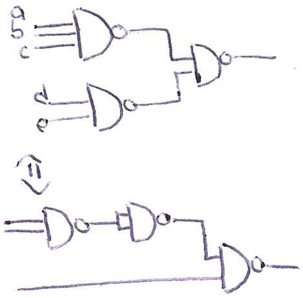
$$Z = \overline{\overline{a.b.c + d.e}}$$
$$= \overline{\overline{a.b.c} \cdot \overline{d.e}}$$



NAND de 3 entradas

Podemos ter só NANDs / NORs de 2 entradas.

Simplificar expressões

	A	B	C	Z
0	0	0	0	0
1	0	0	1	0
2	0	1	0	1
3	0	1	1	1
4	1	0	0	1
5	1	0	1	1
6	1	1	0	0
7	1	1	1	0

mintermos

$$Z = \bar{A}.B.\bar{C} + \bar{A}.B.C + A\bar{B}\bar{C} + A\bar{B}C$$
$$= \bar{A}B(\bar{C}+C) + A\bar{B}(C+\bar{C})$$
$$= \bar{A}B + A\bar{B}$$
$$= A \oplus B$$

→ Manipular expressões
→ Numerar tabela
→ Mapas de Karnaugh

maxtermos

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

$$Z = \Sigma(2,3,4,5)$$
$$Z = \Pi(0,1,6,7)$$

Mapas de Karnaugh

	A	B	Z
0	0	0	1
1	0	1	1
2	1	0	0
3	1	1	0

B \ A	0	1
0	0: 1	2: 0
1	1: 1	3: 0

1ª forma → $\bar{A}$

2ª forma → $\bar{A}$

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