Sistemas digitais

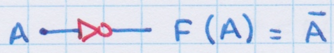
19/09/2018 - T

→ Álgebra de Boole

variável lógica $\quad A \to \{0, 1\}$

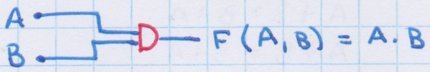
$A \to \square \to F(A)$

i) Negação ou inversão



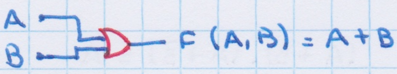
A	$\bar{A}$
0	1
1	0

ii) Interseção ou produto lógico



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

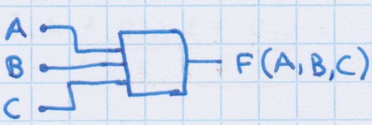
iii) Reunião ou soma lógica



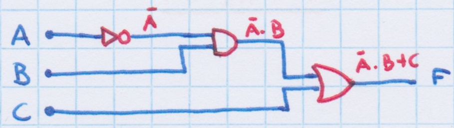
A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

<u>Exemplo</u>

Entradas



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



Postulados

P1	$x = 0$	$x = 1$
P2	$0.0 = 0$	$1.1 = 1$
P3	$0.1 = 1.0 = 0$	$0+1 = 1+0 = 1$
P4	$1+1 = 1$	$0 + \; = 0$
P5	$\bar{0} = 1$	$\bar{1} = 0$

Teoremas

T1	$A.0 = 0$	$A+1 = 1$
T2	$A.1 = A$	$A+0 = A$
T3	$A.A = A$	$A+A = A$
T4	$A.\bar{A} = 0$	$A+\bar{A} = 1$
T5	$\bar{\bar{A}} = A$	
T6	$A.B = B.A$	$A+B = B+A$
T7	$A.B.C = A.(B.C) = (A.B).C$	$A+B+C = A+(B+C) = (A+B)+C$
T8	$A.(B+C) = A.B + A.C$	$A + B.C = (A+B).(A+C)$
T9	$\overline{A.B} = \bar{A} + \bar{B}$	$\overline{A+B} = \bar{A}.\bar{B}$
T10	$A + A.B = A$	$A.(A+B) = A$
T11	$A + \bar{A}.B = A+B$	$A.(\bar{A}+B) = A.B$
T12	$A.B + A.\bar{B} = A$	$(A+B).(A+\bar{B}) = A$
T13	$A.B + \bar{A}.C + B.C = A.B + \bar{A}.C$	$(A+B).(\bar{A}+C).(B+C) = (A+B).(\bar{A}+C)$

simplificação de expressões pelos teoremas

T1 $\quad A.0 = 0 \Rightarrow$ $0.0 = 0$, $1.0 = 0$

T10 $\quad A + AB = A$

$\underline{x + xy = x}$

$$F(A,B,C) = C.D + A.\bar{B}.\bar{C} + B.C.D$$

$$= \underbrace{C.D}_{x} + \underbrace{B}_{y}.\underbrace{C.D}_{x} + A.\bar{B}.\bar{C} \quad \text{T6}$$

$$\underline{x + y\,x} + \ldots \quad \text{T10}$$

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