

Sistemas de Computação

Terceira Aula

Haroldo Gambini Santos

Universidade Federal de Ouro Preto - UFOP

2 de setembro de 2009

1 O Nível Lógico Digital

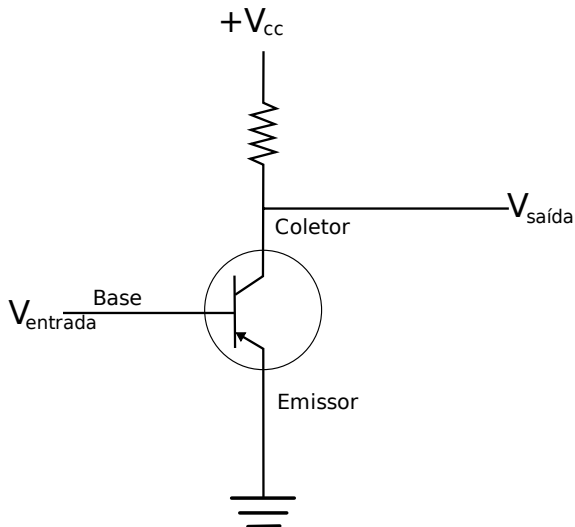
Portas (*Gates*)

- Circuito digital:
 - dois valores lógicos:
 - 0 (Falso)
 - 1 (Verdadeiro)

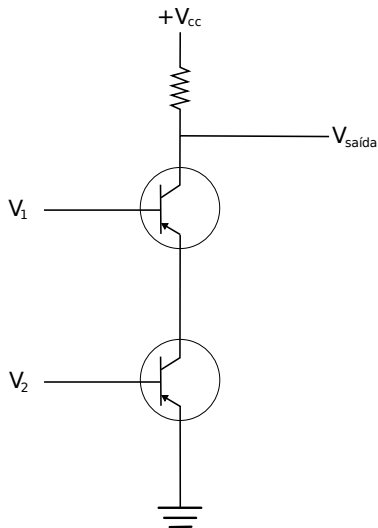
Portas (*Gates*)

- Circuito digital:
 - dois valores lógicos:
 - **0** (Falso)
 - **1** (Verdadeiro)
- Faixas usuais para representação de cada um dos dois valores:
 - $[0, 1]$ volts
 - $[2, 5]$ volts

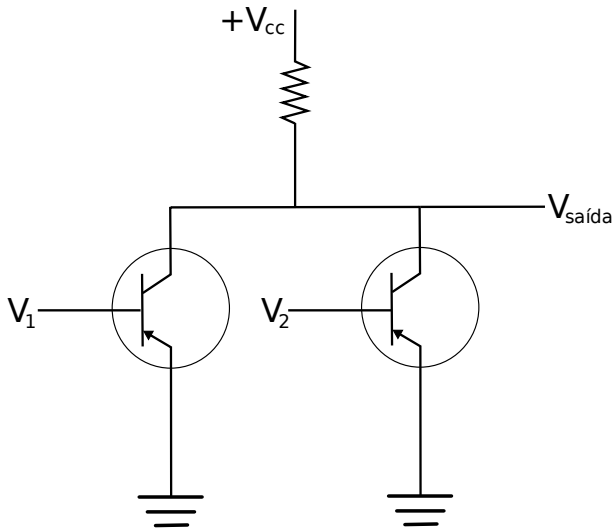
A Porta NOT



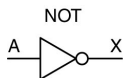
A Porta NAND - *not and*



A Porta **NOR** *not or*

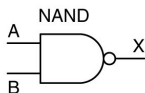


Portas e Lógica Booleana



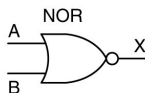
A	X
0	1
1	0

(a)



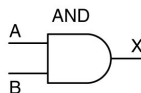
A	B	X
0	0	1
0	1	1
1	0	1
1	1	0

(b)



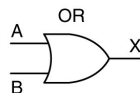
A	B	X
0	0	1
0	1	0
1	0	0
1	1	0

(c)



A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

(d)



A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

(e)

Notação

AB A AND B

$A + B$ A OR B

$\overline{A}$ complemento binário de A (se $A=1$ $\overline{A} = 0$, se $A=0$
 $\overline{\overline{A}} = 1$

Notação

AB A AND B

$A + B$ A OR B

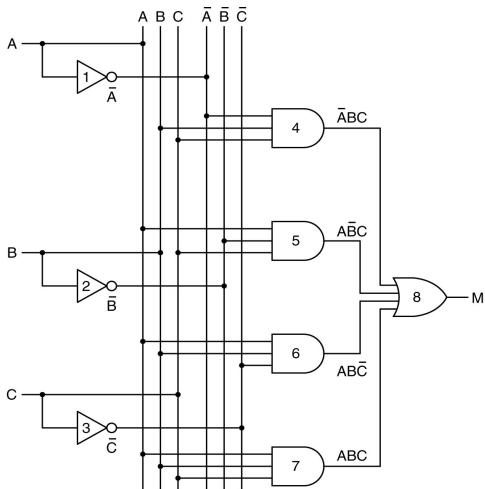
$\overline{A}$ complemento binário de A (se $A=1$ $\overline{A} = 0$, se $A=0$
 $\overline{\overline{A}} = 1$)

- Considerar uso de parênteses
 - $A + (BC)$ **diferente de**
 - $(A + B)C$

A Função Maioria

A	B	C	M
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

(a)

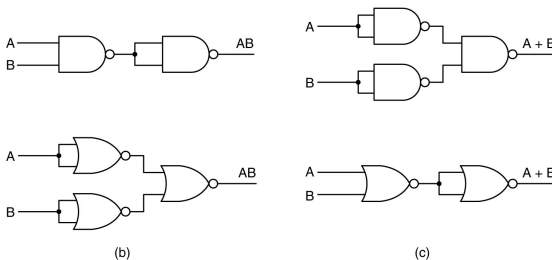
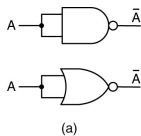


(b)

Álgebra Booleana

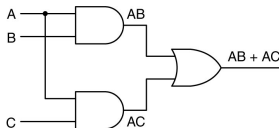
Name	AND form	OR form
Identity law	$1A = A$	$0 + A = A$
Null law	$0A = 0$	$1 + A = 1$
Idempotent law	$AA = A$	$A + A = A$
Inverse law	$A\bar{A} = 0$	$A + \bar{A} = 1$
Commutative law	$AB = BA$	$A + B = B + A$
Associative law	$(AB)C = A(BC)$	$(A + B) + C = A + (B + C)$
Distributive law	$A + BC = (A + B)(A + C)$	$A(B + C) = AB + AC$
Absorption law	$A(A + B) = A$	$A + AB = A$
De Morgan's law	$\overline{AB} = \bar{A} + \bar{B}$	$\overline{A + B} = \bar{A}\bar{B}$

Equivalência de Circuitos



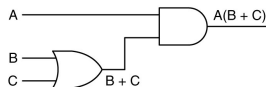
Portas (a) NOT, (b) AND e (c) OR

Equivalência de Circuitos



A	B	C	AB	AC	AB + AC
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	1	0	1
1	1	1	1	1	1

(a)



A	B	C	A	B + C	A(B + C)
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	0	1	0
0	1	1	0	1	0
1	0	0	1	0	0
1	0	1	1	1	1
1	1	0	1	1	1
1	1	1	1	1	1

(b)

Exercícios

Considere um pedido em uma lanchonete:
Um hambúrguer ou um chachorro quente e batatas fritas.
O cozinheiro não sabe se "e" tem precedência sobre "ou".