

Aula 02

Portas Lógicas e Álgebra de Boole

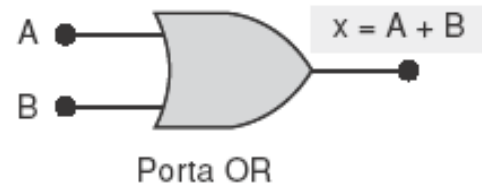
(pág. 43 a 53, 59 a 62, 118 a 123)

PORTA OR (OU)

OR

A	B	$x = A + B$
0	0	0
0	1	1
1	0	1
1	1	1

(a)



(b)

FIGURA 3.2

(a) Tabela-verdade que define a operação OR; (b) Símbolo de uma porta OR de duas entradas.

FIGURA 3.3

Símbolo e tabela-verdade para uma porta OR de três entradas.



A	B	C	$x = A + B + C$
0	0	0	0
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	1

PORTA OR: DIAGRAMA DE TEMPO

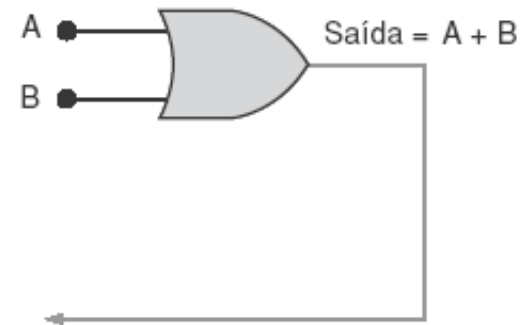
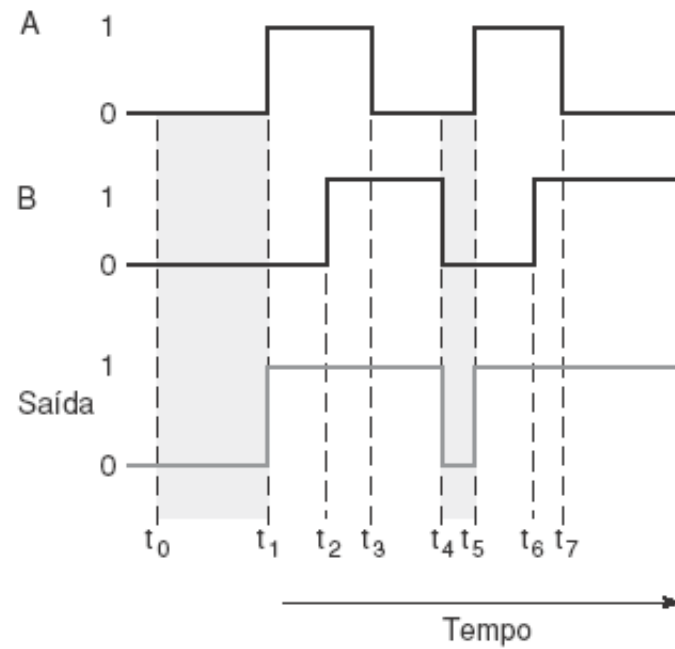
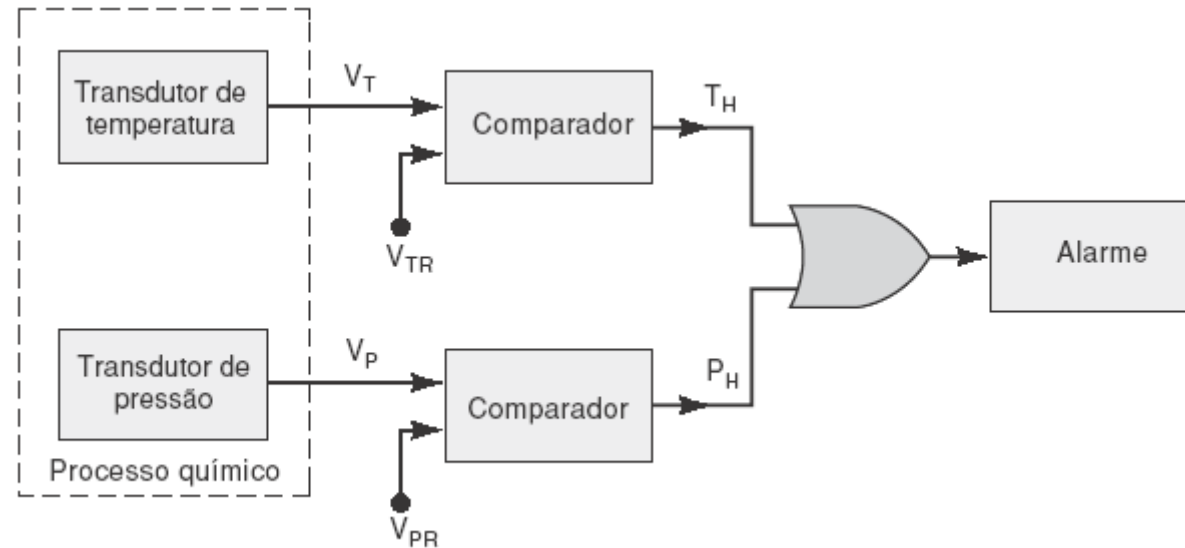


FIGURA 3.5
Exemplo 3.2.

PORTA OR: EXEMPLO

FIGURA 3.4 Exemplo do uso de uma porta OR em um sistema de alarme.



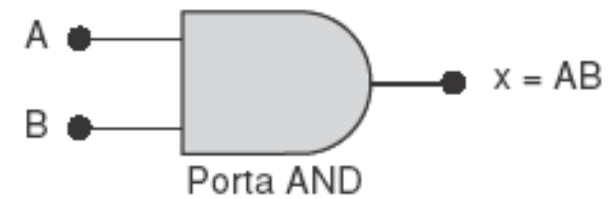
PORTA AND (E)

FIGURA 3.7

(a) Tabela-verdade para a operação AND; (b) símbolo da porta AND.

AND		
A	B	$x = A \cdot B$
0	0	0
0	1	0
1	0	0
1	1	1

(a)



(b)

A	B	C	$x = ABC$
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

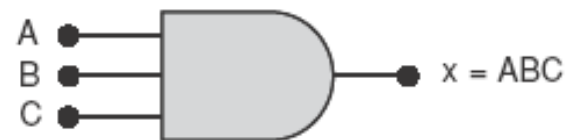


FIGURA 3.8

Tabela-verdade e símbolo para uma porta AND de três entradas.

PORTA AND: DIAGRAMA DE TEMPO

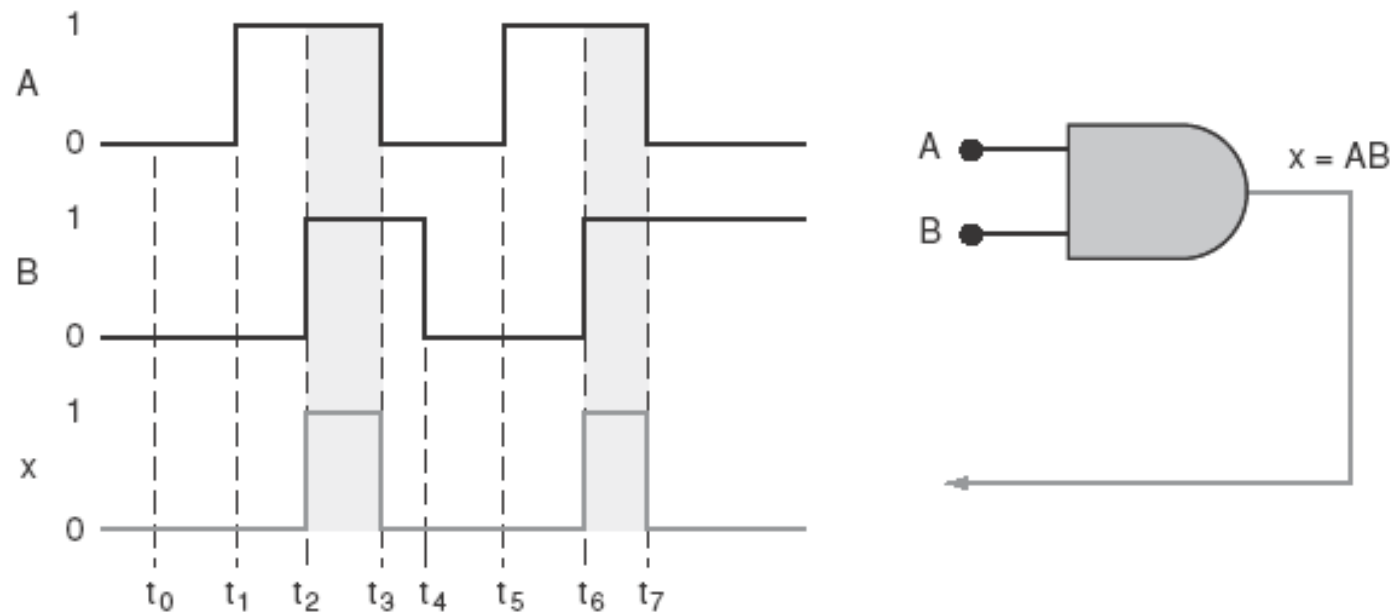
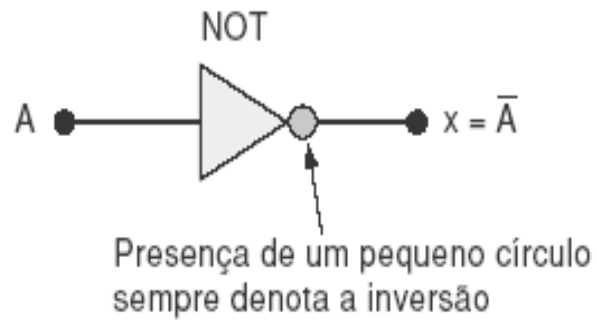


FIGURA 3.9
Exemplo 3.4.

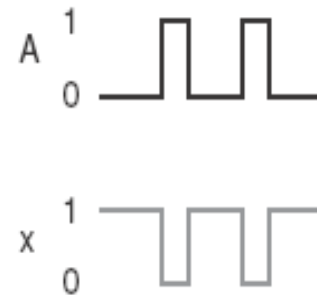
PORTA NOT (NÃO)

NOT		
A		$x = \bar{A}$
0		1
1		0

(a)



(b)



(c)

FIGURA 3.11
(a) Tabela-verdade;
(b) Símbolo para o INVERSOR (circuito NOT); (c) Exemplos de formas de ondas.

PORTA NOT (NÃO): EXEMPLO

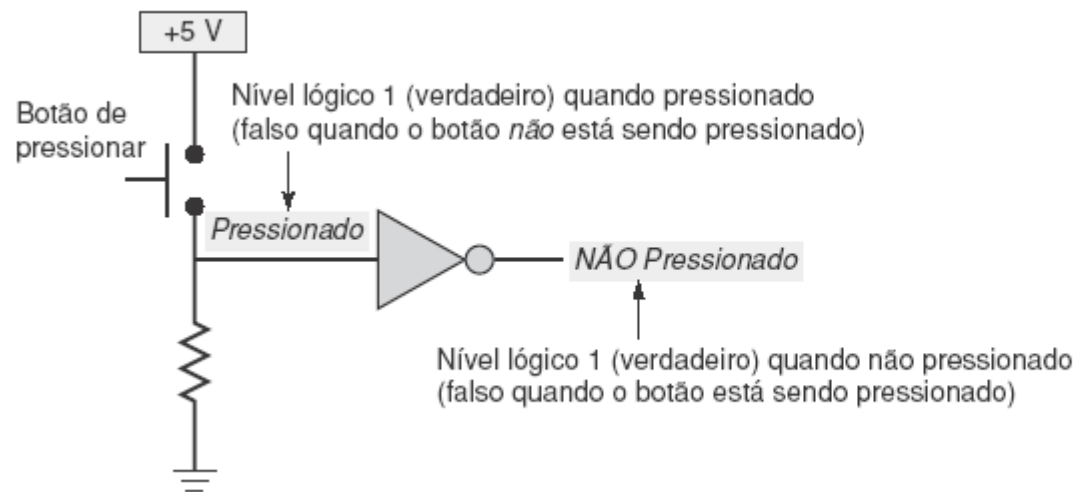


FIGURA 3.12

Uma porta NOT indicando que um botão *não* está pressionado quando a saída é verdadeira.

CIRCUITOS LÓGICOS: EXEMPLOS

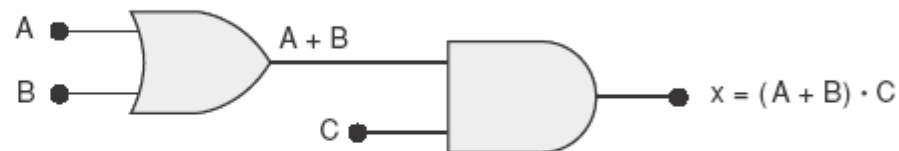


FIGURA 3.13

- (a) Um circuito lógico e suas expressões booleanas;
(b) Circuito lógico com uma expressão que requer parênteses.



(a)

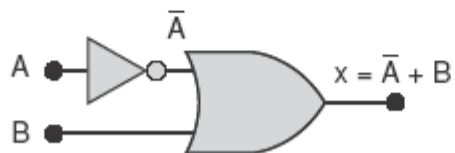


(b)



FIGURA 3.14

Circuitos com INVERSORES.



(a)



(b)

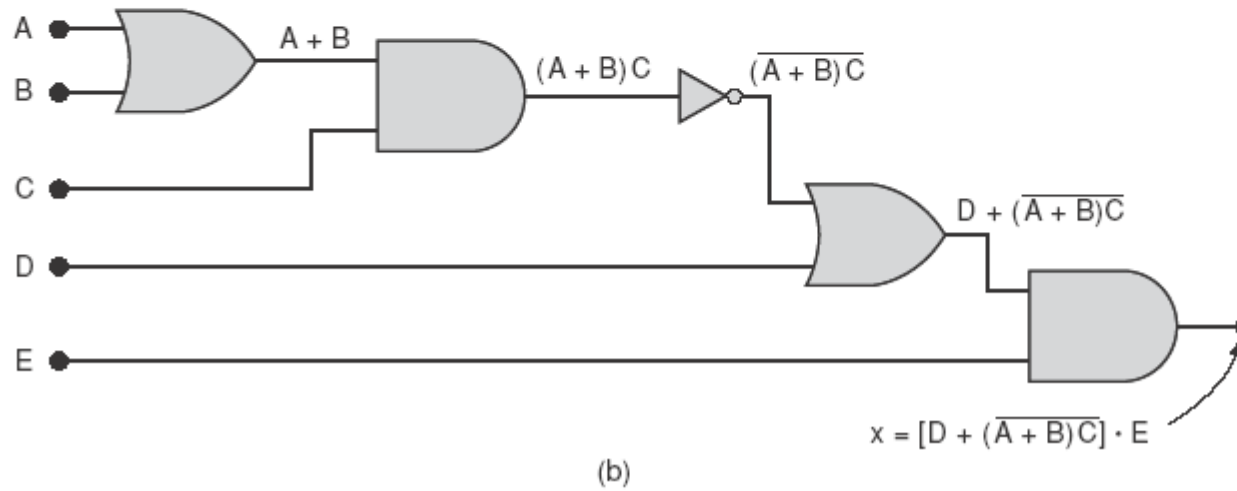
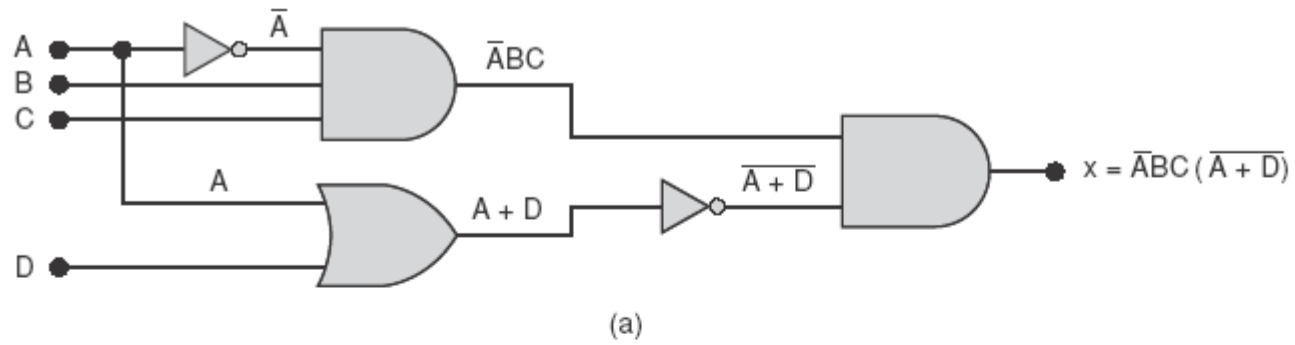


FIGURA 3.15
Mais exemplos.

PORTA NOR (NÃO - OU)

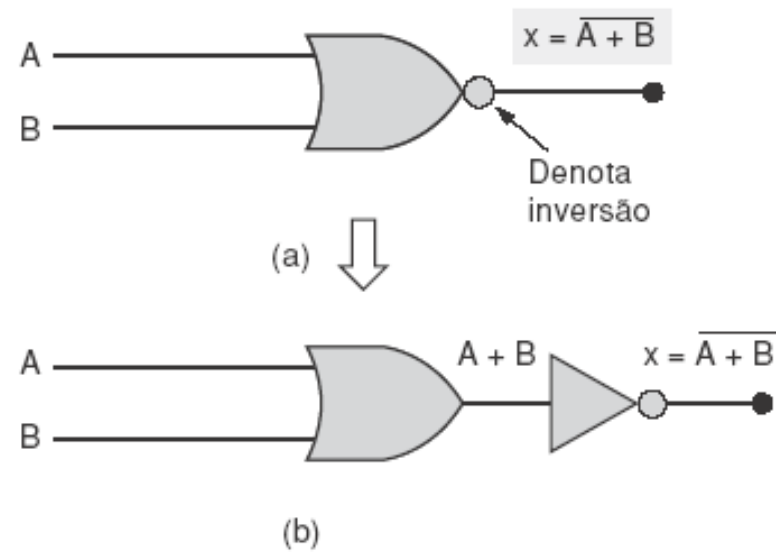


FIGURA 3.19

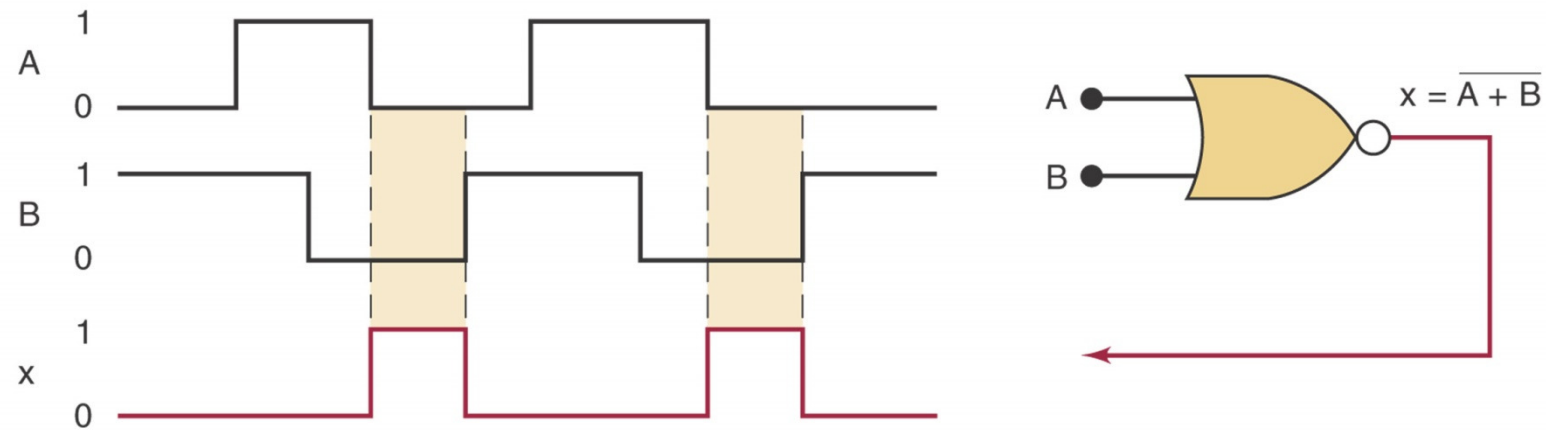
(a) Símbolo da porta NOR;
 (b) Circuito equivalente;
 (c) Tabela-verdade.

A	B	OR		NOR	
			$A + B$		$\overline{A + B}$
0	0		0		1
0	1		1		0
1	0		1		0
1	1		1		0

(c)

PORTA NOR (NÃO - OU): DIAGRAMA DE TEMPO

FIGURA 3.20
Exemplo 3.8.



PORTA NAND (NÃO - E)

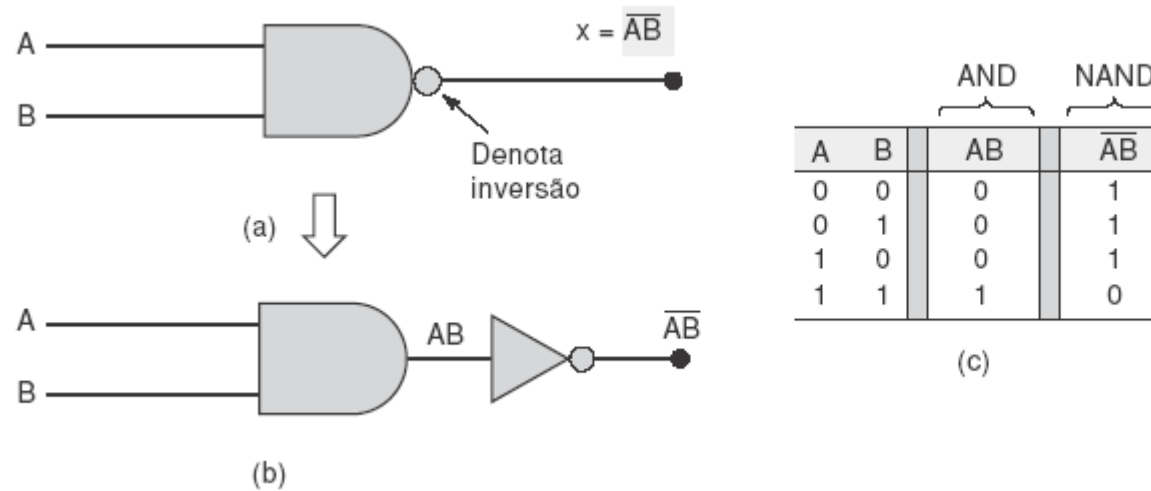


FIGURA 3.22
(a) Símbolo da porta NAND;
(b) Circuito equivalente;
(c) Tabela-verdade.

PORTA NAND (NÃO - E): DIAGRAMA DE TEMPO

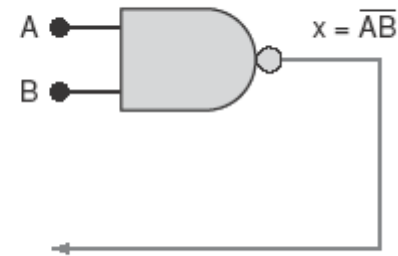
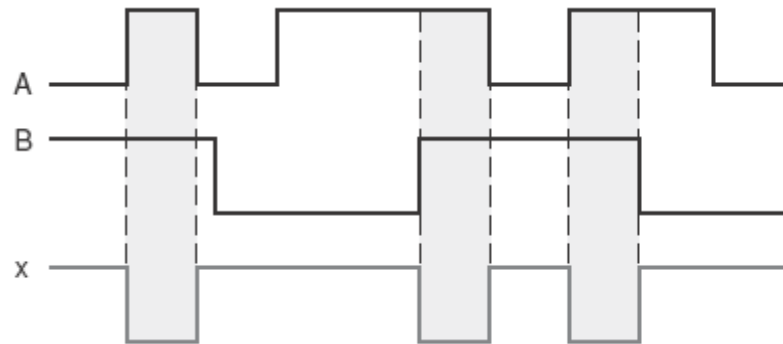
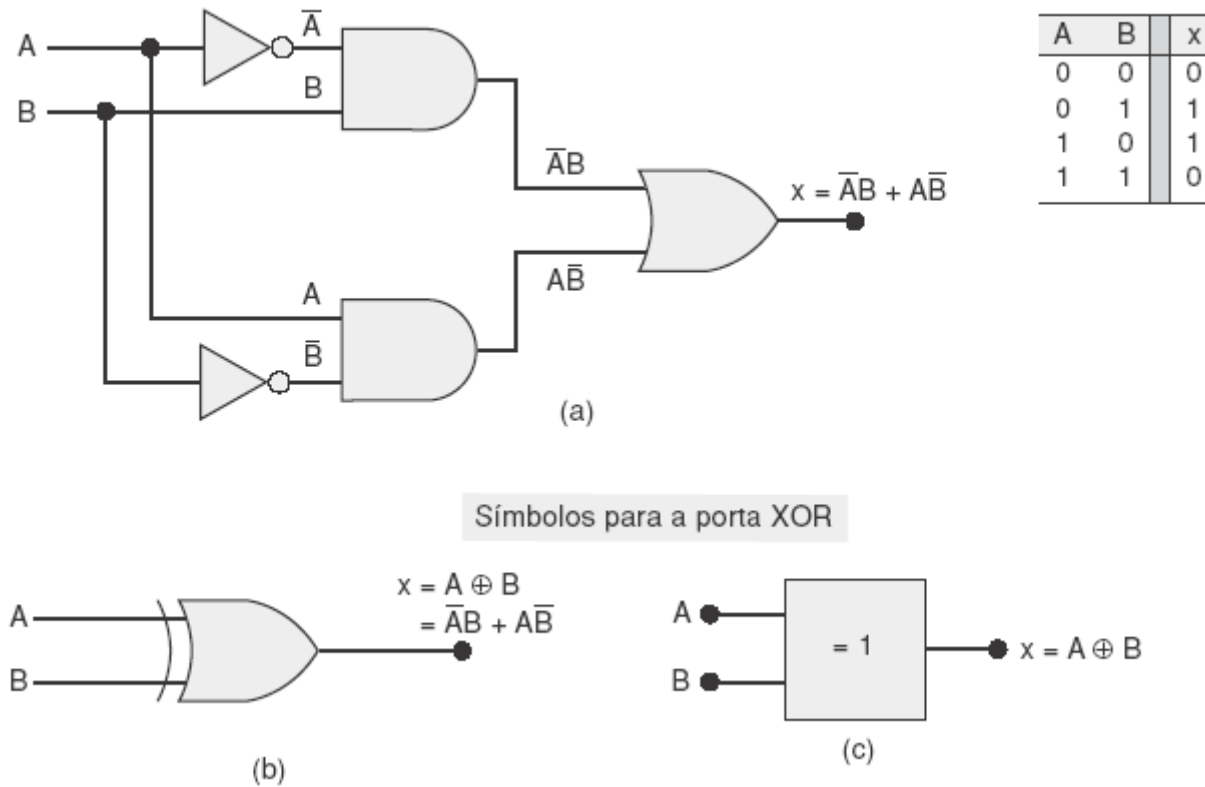


FIGURA 3.23
Exemplo 3.10.

PORTA EXCLUSIVE - OR (OU - EXCLUSIVO)

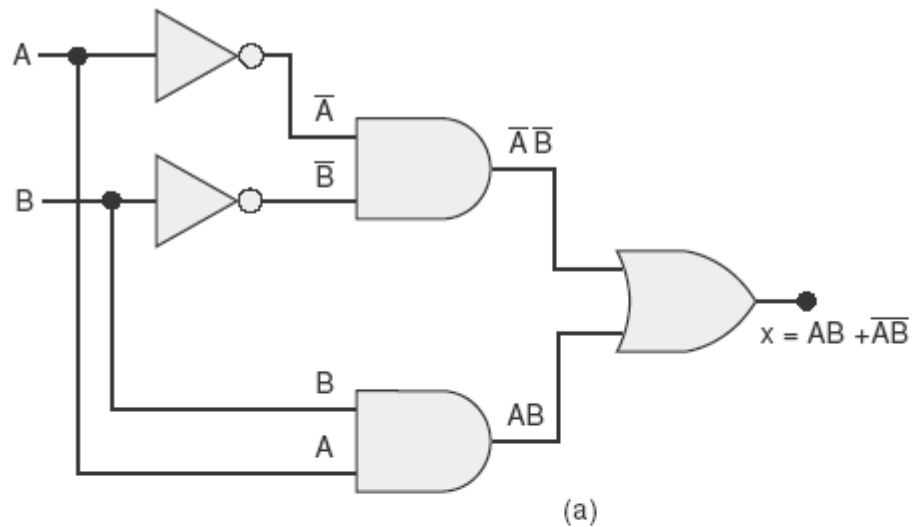
FIGURA 4.20
 (a) Circuito XOR e
 tabela-verdade;
 (b) símbolo tradicional
 para a porta XOR;
 (c) símbolo IEEE/ANSI
 para a porta XOR.



PORTA EXCLUSIVE - NOR (NOU - EXCLUSIVO)

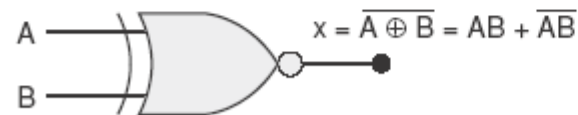
FIGURA 4.21

(a) Circuito exclusive-NOR;
(b) símbolo tradicional para
a porta XNOR; (c) símbolo
IEEE/ANSI.

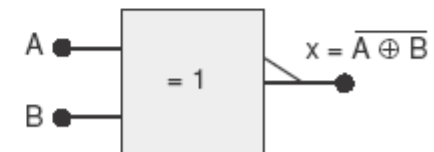


A	B	x
0	0	1
0	1	0
1	0	0
1	1	1

Símbolos para a porta XNOR



(b)



(c)