

Pontifícia Universidade Católica de Minas Gerais



Arquitetura de Computadores I – ACI

Guia 04

Teoremas Booleanos

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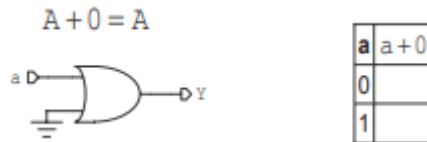
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Belo Horizonte, setembro de 2021.

Para a parte T1 apresentar uma foto das montagens, a equação e a tabela verdade de cada caso. Para as partes T2, T3 e T4 apresentar um printscreen do simulador, as equações e a tabela verdade de cada exercício.

**T1:** Analisar os circuitos abaixo, preencher a tabela verdade e verificar através de montagem.

►  $A + 0 = A$



Equação:  $A + 0 = A$

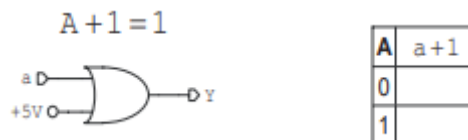
Logisim:



Tabela verdade:

A	A + 0
0	0
1	1

►  $A + 1 = 1$



Equação:  $A + 1 = 1$

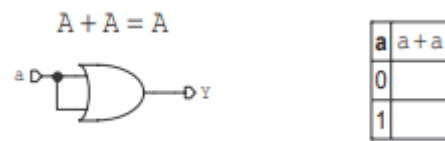
Logisim:



Tabela verdade:

A	A + 1
0	1
1	1

►  $A + A = A$



Equação:  $A + A = A$

Logisim:

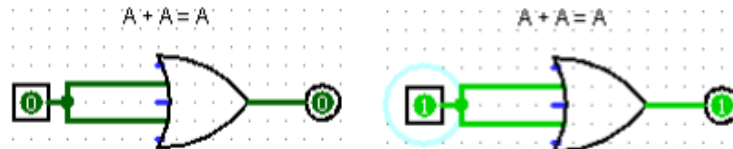
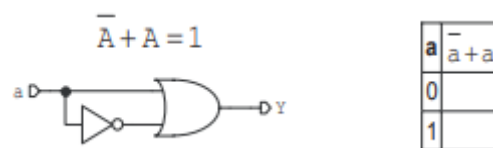


Tabela verdade:

A	$A + A$
0	0
1	1

►  $\bar{A} + A = 1$



Equação:  $\bar{A} + A = 1$

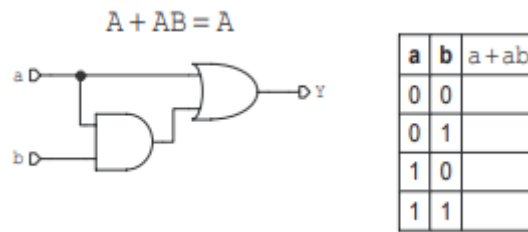
Logisim:



Tabela verdade:

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

►  $A + AB = A$



Equação:  $A + AB = A$

Logisim:

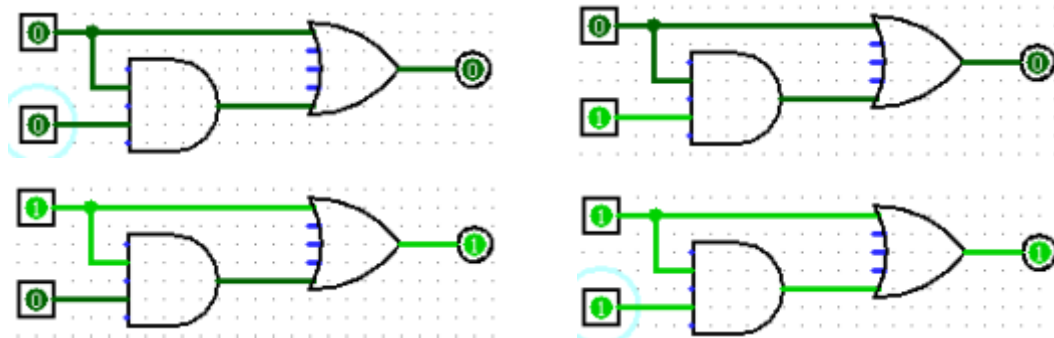
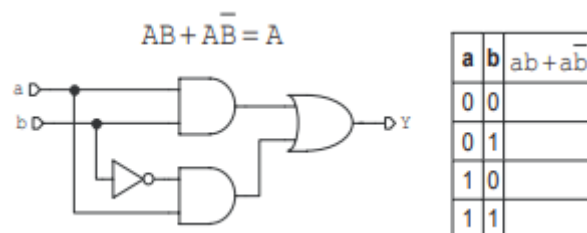


Tabela verdade:

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

►  $AB + A\bar{B} = A$



Equação:  $AB + A\bar{B} = A$

Logisim:

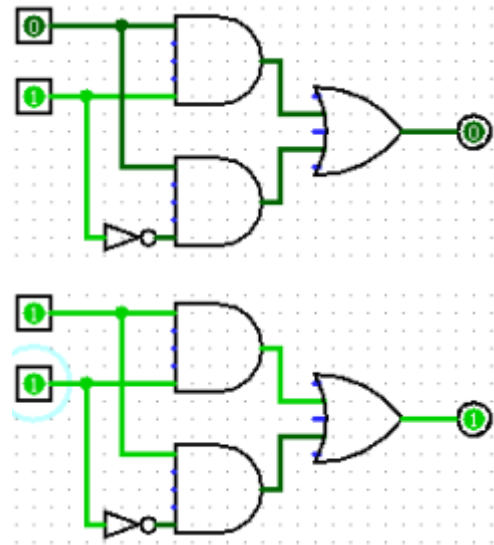
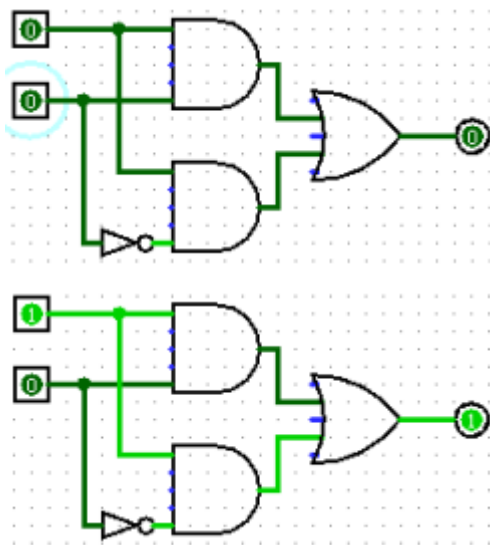
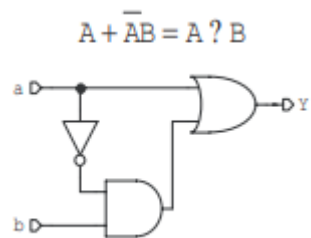


Tabela verdade:

A	B	$AB + A\bar{B}$
0	0	0
0	1	0
1	0	1
1	1	1

•  $A + \bar{A}B = A + B \rightarrow A + B$



a	b	$a + \bar{a}b$
0	0	
0	1	
1	0	
1	1	

Equação:  $A + \bar{A}B = A + B$

Logisim:

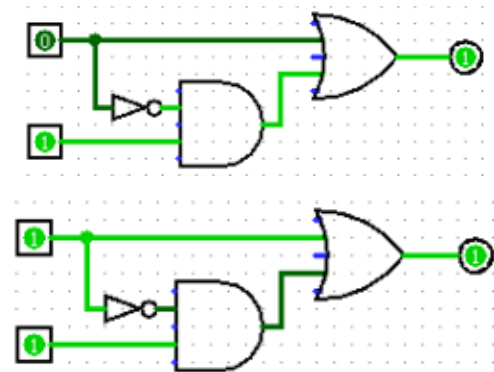
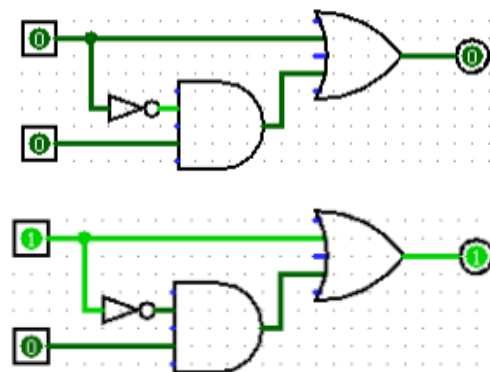


Tabela verdade:

A	B	$A + \overline{A}B$
0	0	0
0	1	1
1	0	1
1	1	1

►  $A + BC = (A?B)?(A?C) \rightarrow (A+B)*(A+C)$

$A + BC = (A?B)?(A?C)$



a	b	c	a+bc	(a?b)?(a?c)
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Equação:  $A + BC = (A+B)*(A+C)$

Logisim:

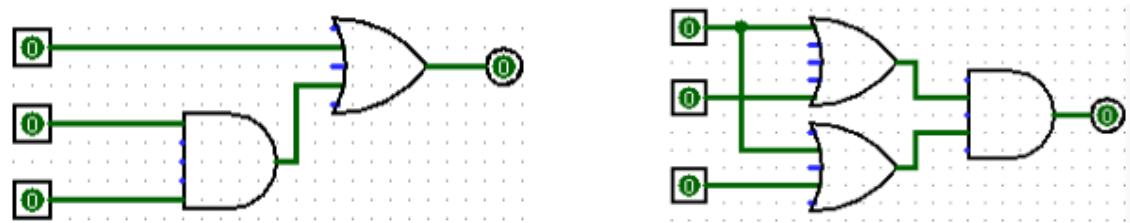
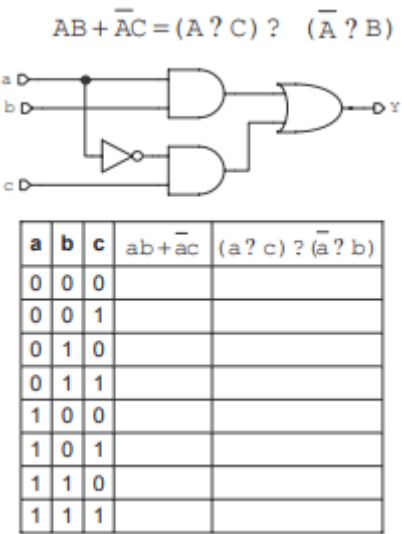


Tabela verdade:

A	B	C	$A + BC$	$(A+B)*(A+C)$
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	1	1
1	0	0	1	1
1	0	1	1	1
1	1	0	1	1
1	1	1	1	1

**T2:** Para os circuitos a seguir, você deverá efetuar as montagens no logisim.

$$AB + \overline{A}C = (A \cdot C) \cdot (\overline{A} + B) \rightarrow (A + C) \cdot (\overline{A} + B)$$



Equação:  $AB + \overline{A}C = (A + C) \cdot (\overline{A} + B)$

Logisim:

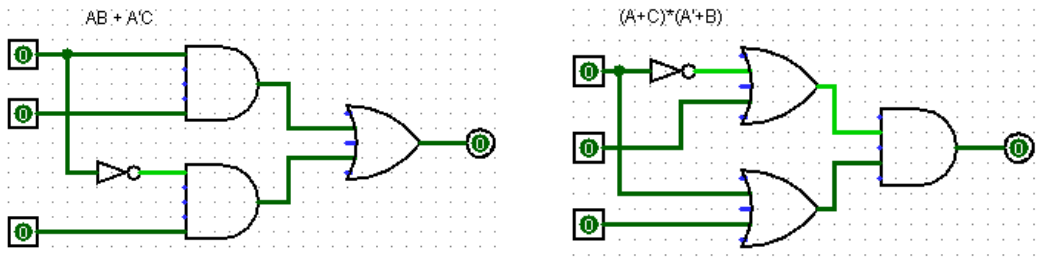
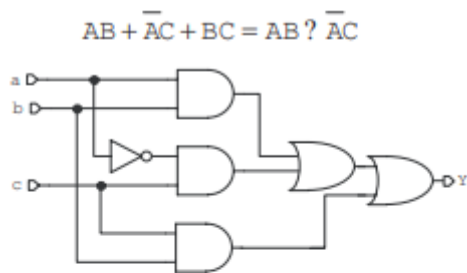


Tabela verdade:

a	b	c	x
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

•  $AB + \overline{A}C + BC = AB + \overline{A}C \rightarrow AB + \overline{A}C$



a	b	c	$ab + \overline{a}c + bc$	$ab + \overline{a}c$
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Equação:  $AB + \overline{A}C + BC = AB + \overline{A}C$

Logisim:

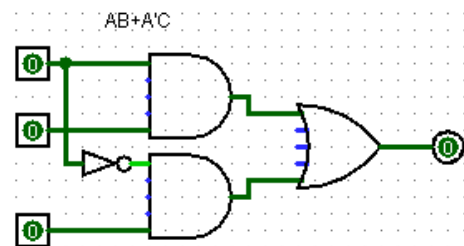
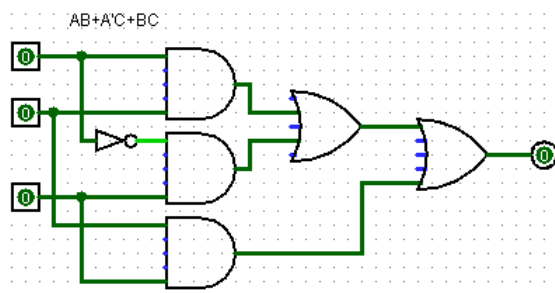


Tabela verdade:

a	b	c	x
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1



**T3:** Projetar um circuito com duas entradas (habilita e dado) e uma única saída “S” de tal forma que quando habilita = 0, S = 0 e quando habilita = 1, S = dado. Montar o circuito e verificar seu funcionamento.

Conectar a entrada “dado” a um sinal de frequência conhecida e verificar o comportamento da saída “S” em função da entrada habilita. → Acredito que no Logisim não é possível conectar a entrada à um gerador de frequência.

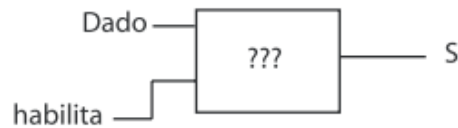
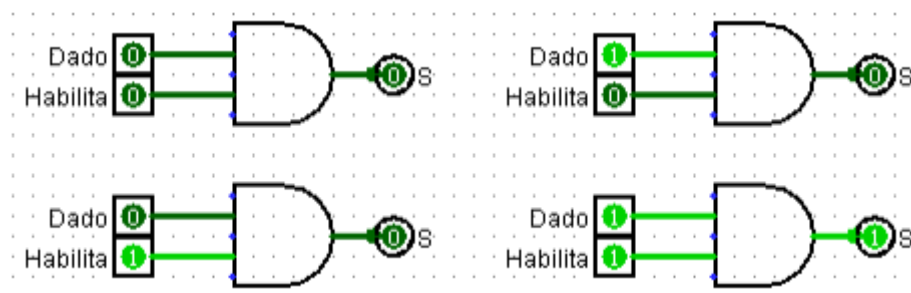


Tabela verdade:

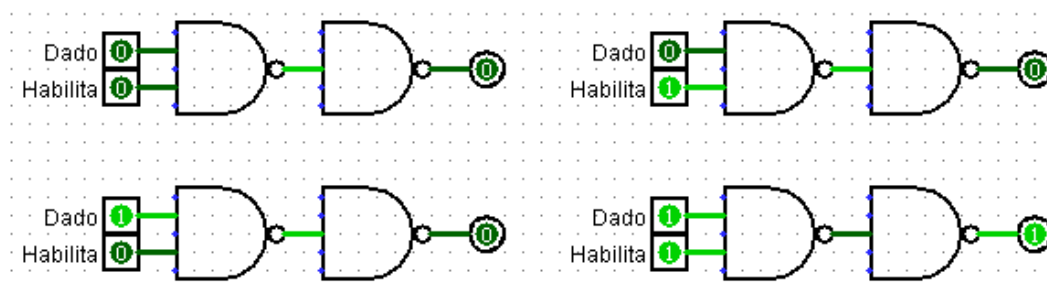
Dado	Habilita	Saída S
0	0	0
0	1	0
1	0	0
1	1	1

Logisim:



**T4:** Repetir o item anterior utilizando portas NAND.

Logisim:



$$\text{Equação: } S = \overline{\overline{Dado * Habilita}}$$