

Example 1 Logic Gates

Monday, 24 August, 2020 5:11 PM

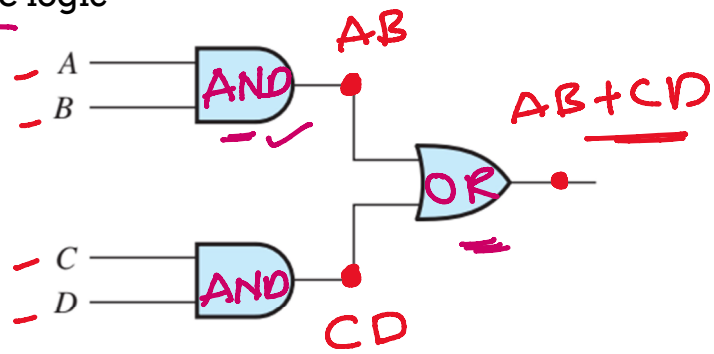
- Write a Boolean expression for the output of the logic circuit

AND
OR
NOT

NAND

NOR

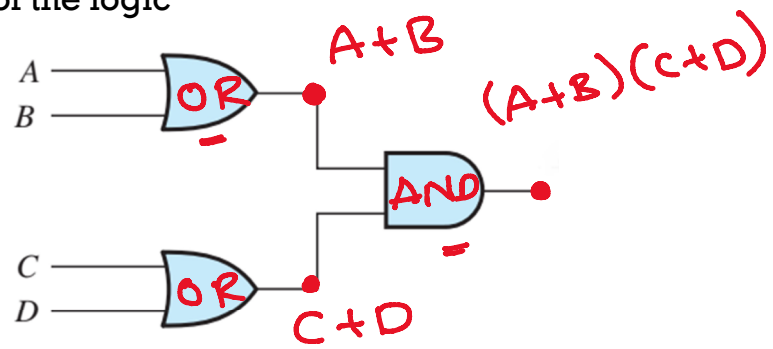
XOR



Example 2

Monday, 24 August, 2020 5:11 PM

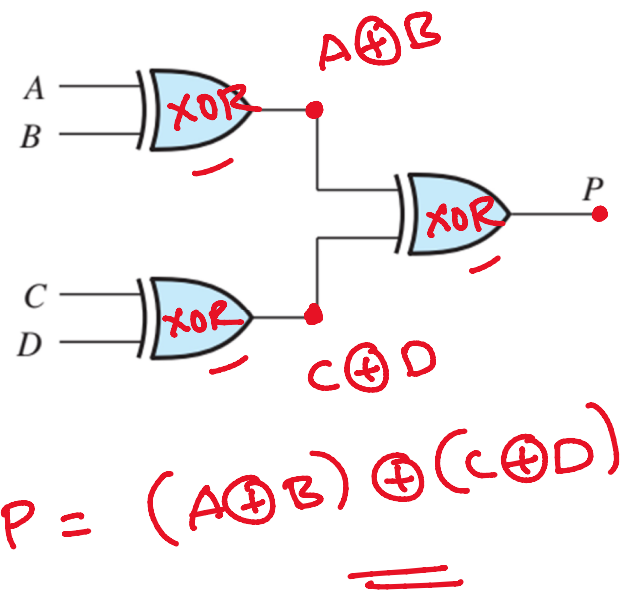
- Write a Boolean expression for the output of the logic circuit



Example 3

Monday, 24 August, 2020 5:11 PM

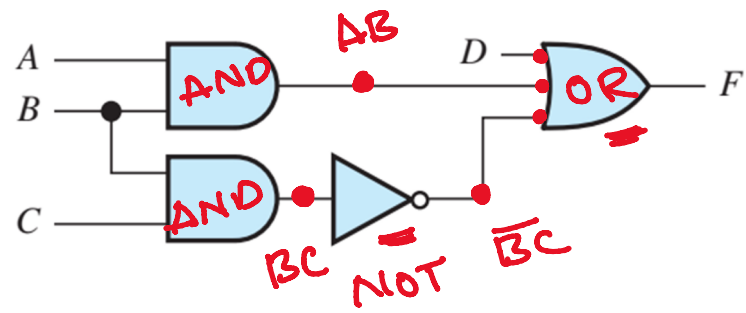
- Write a Boolean expression for the output of the logic circuit



Example 4

Monday, 24 August, 2020 5:11 PM

- Write a Boolean expression for the output of the logic circuit

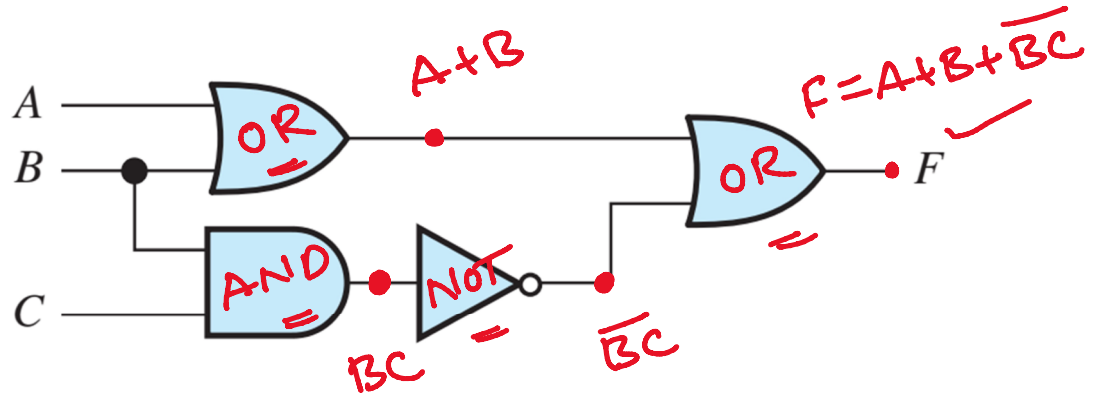


$$F = D + AB + \overline{BC}$$

Example 5

Monday, 24 August, 2020 5:11 PM

- Write a Boolean expression for the output of the logic circuit
- Also give the truth table for the circuit



Truth table.

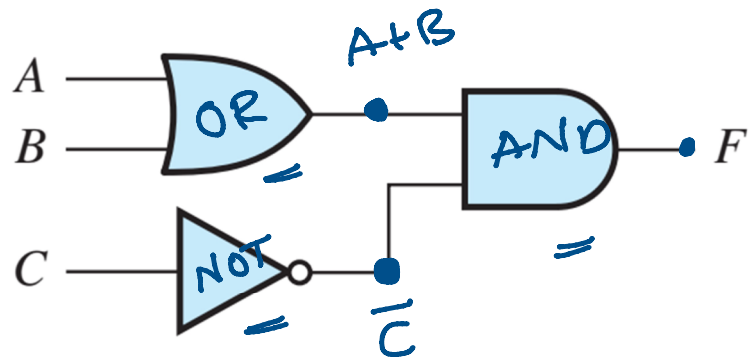
$$F = A + B + \overline{BC}$$

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

Example 6

Monday, 24 August, 2020 5:11 PM

- Write a Boolean expression for the output of the logic circuit
- Also give the truth table for the circuit



Truth table.

$$F = (A+B)\overline{C}$$

A	B	C	$A+B$	\overline{C}	$(A+B)\overline{C}$
0	0	0	0	1	0
0	0	1	0	0	0
0	1	0	1	1	1
0	1	1	1	0	0
1	0	0	1	1	1
1	0	1	1	0	0
1	1	0	1	1	1
1	1	1	1	0	0

Example 1 Boolean Algebra

Monday, 24 August, 2020 5:43 PM

- **Example 1:** Prove the associative law for the OR operation, which states that

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

<u>LHS</u>			<u>RHS</u>		<u>LHS</u>		<u>B+C</u>		<u>RHS</u>	
A	B	C	A+B		(A+B)+C		A+(B+C)		A+(B+C)	
0	0	0	0		0		0		0	
0	0	1	0		1		1		1	
0	1	0	1		1		1		1	
0	1	1	1		1		1	0	1	
1	0	0	1		1		1	0	1	
1	0	1	1		1		1	1	1	
1	1	0	1		1		1	1	1	
1	1	1	1		1		1	1	1	

Monday, 24 August, 2020 5:44 PM

Monday, 24 August, 2020

5:44 PM

- $$A(BC) = (AB)C = ABC$$

$$\frac{A(B + C)}{\text{LHS}} = \frac{AB + AC}{\text{RHS}} \checkmark$$

✓	A ✓	B	C ✓
✓	0	0	0
	0	0	1
	0	1	0
	0	1	1
	1	0	0
	1	0	1
	1	1	0
		1	1

✓ B+C

○

○

LHS ✓
A(B+C)

$$\begin{array}{ccc} & & \checkmark \text{ RHS} \\ \underline{AB} + AC & = & \underline{AB+AC} \\ \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 1 \end{array} & & \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 1 \\ 1 \end{array} \end{array}$$

Example 3

Monday, 24 August, 2020

5:44 PM

- **Example 3:** Prepare a truth table for the logic expression

$$D = AB + C$$

			AB		$AB + C$
A	B	C			
0	0	0	0	0	0
0	0	1	0	0	1
0	1	0	0	0	0
0	1	1	0	0	1
1	0	0	0	0	0
1	0	1	0	0	1
1	1	0	1	1	1
1	1	1	1	1	1