Boolean Notation to Logic Gates
and vice versa!

The following table gives a list of the common logic functions and their equivalent Boolean notation.

|  |  |
| --- | --- |
| Logic Function | Boolean Notation |
| AND | A.B |
| OR | A+B |
| NOT | $$\overline{A}$$ |
| NAND | $$\overline{A .B}$$ |
| NOR | $$\overline{A+B}$$ |
| EX-OR | (A.$\overline{B}$) + ($\overline{A}$.B) or A⊕B |
| EX-NOR | (A.B) + ($\overline{A}$.$\overline{B}$) or $\overline{A}$ $\overline{⊕}$  $\overline{B}$ |

## Exercise

1. Find the Boolean algebra expression for the following system.



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1. Draw the circuit diagram to implement the expression
 $X= (A+B)(\overline{B}+C)$

**Useful tips.** This expression was created in Word by a) Insert , b)Equation, c) Accent, d) Overbar

To get XOR symbol, type 2295 then press Alt/X

1. Draw the circuit diagram to implement the expression
 $X= \overline{A}BC(\overline{A+D})$

**Truth Tables for the Laws of Boolean**

|  |  |  |  |
| --- | --- | --- | --- |
| BooleanExpression | Description | EquivalentSwitching Circuit | Boolean AlgebraLaw or Rule |
| A + 1 = 1 | A in parallel withclosed = "CLOSED" | universal parallel circuit | Annulment |
| A + 0 = A | A in parallel withopen = "A" | universal parallel | Identity |
| A . 1 = A | A in series withclosed = "A" | universal series circuit | Identity |
| A . 0 = 0 | A in series withopen = "OPEN" | universal series | Annulment |
| A + A = A | A in parallel withA = "A" | idempotent parallel circuit | Idempotent |
| A . A = A | A in series withA = "A" | idempotent series circuit | Idempotent |
| NOT A = A | NOT NOT A(double negative) = "A" |   | Double Negation |
| A + A = 1 | A in parallel withNOT A = "CLOSED" | complement parallel circuit | Complement |
| A . A = 0 | A in series withNOT A = "OPEN" | complement series circuit | Complement |
| A+B = B+A | A in parallel with B =B in parallel with A | absorption parallel circuit | Commutative |
| A.B = B.A | A in series with B =B in series with A | absorption series circuit | Commutative |
| A+B = A.B | invert and replace OR with AND |   | de Morgan’s Theorem |
| A.B = A+B | invert and replace AND with OR |   | de Morgan’s Theorem |

Answers to Exercise

1. 
2. 
3. 
4. 