

Section 5 - Boolean Algebra

Wednesday, June 19, 2019 11:14 AM

• SECTION 5 •

• • • BOOLEAN ALGEBRA • • •

- SO BOOLEAN ALGEBRA IS DOING MATH WITH BOOLEAN EXPRESSION.
- EACH LOGIC GATE IS AN OPERATION

OPERATION	SHORTHAND
$a \text{ AND } b$	ab
$a \text{ OR } b$	$a + b$
$\text{NOT } a$	a'

Item	Notation	Explanation
Expression	ab	involves input variables
Equation	$y = ab$	has "=" sign
Function	various	any relation of input & output

PROPERTY	NAME
$a(b+c) = ab+ac$	Distributive AND
$a+(bc) = (a+b)c$	Distributive OR
$ab = ba$	Commutative AND
$a+b = b+a$	Commutative OR
$(ab)c = a(bc)$	Associative AND
$(a+b)+c = a+(b+c)$	Associative OR
$aa' = 0$	Complement AND
$a+a' = 1$	Complement OR
$a \cdot 1 = a$	Identity AND
$a + 0 = a$	Identity OR
$a \cdot 0 = 0$	Null Elements
$a + 1 = 1$	Null Elements
$a \cdot a = a$	Idempotent
$a + a = a$	Idempotent
$(a')' = a$	Involution
$(ab)' = a' + b'$	DeMorgan's Law
$(a+b)' = a'b'$	DeMorgan's Law

Canonical Form • STANDARD FORM OF A
BOOLEAN EQUATION

LITERAL • a variable appearance

- b or b'

Minterm • a product having one literal/
per each input variable

- abc or $x'yz$

SUM-OF-MINTERMS • a canonical form of
a boolean equation

- a sum of unique minterms

• USE PROPERTIES TO GET TO SUM
FORM

• USE TRUTH TABLE TO FORM A
SUM EQUATION

SUM OF PRODUCTS • A CANONICAL BOOLEAN
ALG FORM

- USES PRODUCT TERMS INSTEAD
OF MINTERMS

PRODUCT TERM. A minterm but does not require each literal

- TRUTH TABLE CAN HAVE MULTIPLE OUTPUTS

- EACH OUTPUT HAS ITS OWN EQUATION