

Boolean Laws

Rule #1

Anything *AND*-ed with a 0 is equal to 0:

$$A \cdot 0 = 0$$

Rule #2

Anything *AND*-ed with a 1 is equal to itself:

$$A \cdot 1 = A$$

Rule #3

Anything *OR*-ed with a 0 is equal to itself:

$$A + 0 = A$$

Rule #4

Anything *OR*-ed with a 1 is equal to 1:

$$A + 1 = 1$$

Rule #5

Anything *AND*-ed with itself is equal to itself:

$$A \cdot A = A$$

Rule #6

Anything *OR*-ed with itself is equal to itself:

$$A + A = A$$

Rule #7

Anything *AND*-ed with its own compliment is equal to 0:

$$A \cdot A' = 0$$

Rule #8

Anything *OR*-ed with its own compliment is equal to 1:

$$A + A' = 1$$

Rule #9

A variable complimented twice will return to its original logic level:

$$A'' = A$$

Rule #10

$$A + A'B = A + B$$

$$A' + AB = A' + B$$

Boolean Expressions

Sum-of-Products Form

Minterm form:

$$(A \cdot B) + (C \cdot D)$$

Product-of-Sums Form

Maxterm form:

$$(A + B) \cdot (C + D)$$

DeMorgans Theorem

Converting an expression with an inversion over 2 or more variables to an expression with inversion bars over single variables:

$$(A \cdot B)' = (A' + B')$$

$$(A + B)' = (A' \cdot B')$$

Commutative Law of Addition and Multiplication

The order of *OR*-ing or *AND*-ing does not matter:

$$A + B = B + A$$

$$AB = BA$$

Associative Law of Addition and Multiplication

The grouping of several variables of *OR*-ed or *AND*-ed does not matter:

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

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

Distributive Law of Addition and Multiplication

Method for expanding an equation containing *OR*s and *AND*s:

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

$$(A + B)(C + D) = AC + AD + BC + BD$$