

### Identities

$$0 + X = X$$

$$0 \cdot X = 0$$

$$1 + X = 1$$

$$1 \cdot X = X$$

$$X + X = X$$

$$X \cdot X = X$$

### Negation

$$X + \sim X = 1$$

$$\sim 0 = 1$$

$$\sim 1 = 0$$

$$\sim \sim X = X$$

$$X \cdot \sim X = 0$$

### Laws

Commutative Law  $A \cdot B = B \cdot A$

$$A + B = B + A$$

Associative Law  $A \cdot (B \cdot C) = (A \cdot B) \cdot C$

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

Distributive Law  $A \cdot (B + C) = A \cdot B + A \cdot C$

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

### De Morgan's Laws

$$\sim(X \cdot Y) = X + Y$$

$$\sim(X + Y) = X \cdot Y$$

$$\sim(X \cdot Y \cdot Z) = X + Y + \sim Z$$

$$\sim(X + Y + Z) = X \cdot Y \cdot \sim Z$$

### Theorems

#### Theorem 1

$$X + X \cdot Y = X$$

#### Theorem 2

$$X + \sim X \cdot Y = X + Y$$

#### Theorem 3

$$X \cdot Y + X \cdot Z + Y \cdot Z = X \cdot Y + X \cdot Z$$

#### Theorem 4

$$X(X + Y) = X$$

#### Theorem 5

$$X(\sim X + Y) = X \cdot Y$$

#### Theorem 6

$$(X + Y)(X + \sim Y) = X$$

#### Theorem 7

$$(X + Y)(X + Z) = X + Z + X \cdot Y$$

#### Theorem 8

$$(X + Y)(X + Z)(Y + Z) = (X + Y)(X + Z)$$



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Published 16th January, 2017.

Last updated 16th January, 2017.

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