Summary of Boolean Identities and Laws

Laws of Single Variables

1) Identity Laws

a: $x + 0 = x$ b: $x \cdot 1 = x$

2) Laws of 0 and 1

a: $x + 1 = 1$ b: $x \cdot 0 = 0$

3) Idempotent Laws

a: $x + x = x$ b: $x \cdot x = x$

4) Involution (Double Negation)

$\bar{\bar{x}} = x$

5) Laws of Complementarity

a: $x + \bar{x} = 1$ b: $x \cdot \bar{x} = 0$

Laws of Multiple Variables

6) Commutative Laws

a: $x + y = y + x$ b: $x \cdot y = y \cdot x$

7) Associative Laws

a: $(x + y) + z = x + (y + z)$ b: $(x \cdot y) \cdot z = x \cdot (y \cdot z)$

8) Distributive Laws

a: $x + (y \cdot z) = (x + y) \cdot (x + z)$ b: $x \cdot (y + z) = x \cdot y + x \cdot z$

9) De Morgan Laws

a: $\overline{x + y} = \bar{x} \cdot \bar{y}$ b: $\overline{x \cdot y} = \bar{x} + \bar{y}$

10) Simplification Theorems

a: $x \cdot y + x \cdot \bar{y} = x$ b: $(x + y) \cdot (x + \bar{y}) = x$

c: $x + x \cdot y = x$ d: $x \cdot (x + y) = x$

e: $(x + \bar{y}) \cdot y = x \cdot y$ f: $x \cdot \bar{y} + y = x + y$

11) Consensus Theorem

a: $x \cdot y + y \cdot z + \bar{x} \cdot z = x \cdot y + \bar{x} \cdot z$ b: $(x + y) \cdot (y + z) \cdot (\bar{x} + z) = (x + y) \cdot (\bar{x} + z)$

c: $(x + y) \cdot (\bar{x} + z) = x \cdot z + \bar{x} \cdot y$