

Boolean Algebra Axioms¹

$$1a. \quad 0 \cdot 0 = 0$$

$$1b. \quad 1 + 1 = 1$$

$$2a. \quad 1 \cdot 1 = 1$$

$$2b. \quad 0 + 0 = 0$$

$$3a. \quad 0 \cdot 1 = 1 \cdot 0 = 0$$

$$3b. \quad 1 + 0 = 0 + 1 = 1$$

$$4a. \quad \text{If } x = 0, \text{ then } \bar{x} = 1$$

$$4b. \quad \text{If } x = 1, \text{ then } \bar{x} = 0$$

$$5a. \quad x \cdot 0 = 0$$

$$5b. \quad x + 1 = 1$$

$$6a. \quad x \cdot 1 = x$$

$$6b. \quad x + 0 = x$$

$$7a. \quad x \cdot x = x$$

$$7b. \quad x + x = x$$

$$8a. \quad x \cdot \bar{x} = 0$$

$$8b. \quad x + \bar{x} = 1$$

$$9. \quad \bar{\bar{x}} = x$$

$$10a. \quad x \cdot y = y \cdot x$$

$$10b. \quad x + y = y + x$$

$$11a. \quad x \cdot (y \cdot z) = (x \cdot y) \cdot z$$

$$11b. \quad x + (y + z) = (x + y) + z$$

$$12a. \quad x \cdot (y + z) = x \cdot y + x \cdot z$$

$$12b. \quad x + y \cdot z = (x + y) \cdot (x + z)$$

$$13a. \quad x + x \cdot y = x$$

$$13b. \quad x \cdot (x + y) = x$$

$$14a. \quad x \cdot y + x \cdot \bar{y} = x$$

$$14b. \quad (x + y) \cdot (x + \bar{y}) = x$$

$$15a. \quad \overline{x \cdot y} = \bar{x} + \bar{y}$$

$$15b. \quad \overline{x + y} = \bar{x} \cdot \bar{y}$$

$$16a. \quad x + \bar{x} \cdot y = x + y$$

$$16b. \quad x \cdot (\bar{x} + y) = x \cdot y$$

$$17a. \quad x \cdot y + y \cdot z + \bar{x} \cdot z = x \cdot y + \bar{x} \cdot z$$

$$17b. \quad (x + y) \cdot (y + z) \cdot (\bar{x} + z) = (x + y) \cdot (\bar{x} + z)$$

Commutative

Associative

Distributive

Absorption

Combining

DeMorgan's theorem

Consensus

¹ Source: Fundamentals of Digital Logic with Verilog Design, Stephen Brown, Zvonko Vranesic
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