LAWS AND IDENTITIES OF BOOLEAN ALGEBRA

Associative Laws

$$(A \land B) \land C = A \land (B \land C)$$

$$(A \lor B) \lor C = A \lor (B \lor C)$$

Commutative Laws

$$A \land B = B \land A$$

$$A \lor B = B \lor A$$

Distributive Laws

$$A \land (B \lor C) = (A \land B) \lor (A \land C)$$

$$A \lor (B \land C) = (A \lor B) \land (A \lor C)$$

De Morgan's Theorem

$$\neg (A \lor B) = \neg A \land \neg B$$

$$\neg (A \land B) = \neg A \lor \neg B$$

$$\neg\neg A = A$$

Negation of Conditional

$$\neg (A \rightarrow B) = A \land \neg B$$

Conditional as Disjunction

$$(A \rightarrow B) = \neg A \lor B$$

Negation of Biconditional

$$\neg (A \Leftrightarrow B) = A \Leftrightarrow \neg B$$

Biconditional as Conjunction

$$A \Leftrightarrow B = (A \rightarrow B) \land (B \rightarrow A)$$

Negation of Quantifier

$$\neg\forall x(Px) = \exists x(\neg Px)$$

$$\neg\forall x(\neg Px) = \exists x(Px)$$

$$\neg\exists x(Px) = \forall x(\neg Px)$$

$$\neg\exists x(\neg Px) = \forall x(Px)$$