

Properties of Logical Connectives

These identities hold for all propositions p, q, r

- Identity

- $p \wedge T \equiv p$
- $p \vee F \equiv p$

- Domination

- $p \vee T \equiv T$
- $p \wedge F \equiv F$

- Idempotent

- $p \vee p \equiv p$
- $p \wedge p \equiv p$

- Commutative

- $p \vee q \equiv q \vee p$
- $p \wedge q \equiv q \wedge p$

- Associative

- $(p \vee q) \vee r \equiv p \vee (q \vee r)$
- $(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$

- Distributive

- $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$
- $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$

- Absorption

- $p \vee (p \wedge q) \equiv p$
- $p \wedge (p \vee q) \equiv p$

- Negation

- $p \vee \neg p \equiv T$
- $p \wedge \neg p \equiv F$

- DeMorgan's Laws

- $\neg(p \vee q) \equiv \neg p \wedge \neg q$
- $\neg(p \wedge q) \equiv \neg p \vee \neg q$

- Double Negation

- $\neg\neg p \equiv p$

- Law of Implication

- $p \rightarrow q \equiv \neg p \vee q$

- Contrapositive

- $p \rightarrow q \equiv \neg q \rightarrow \neg p$