

CSE 311: Foundations of Computing I

Properties of Logical Connectives Reference Sheet

Identity

- $p \wedge \top \equiv p$
- $p \vee \text{F} \equiv p$

Domination

- $p \vee \top \equiv \top$
- $p \wedge \text{F} \equiv \text{F}$

Idempotency

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

Commutativity

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

Associativity

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

Distributivity

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

Absorption

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

Negation

- $p \vee \neg p \equiv \top$
- $p \wedge \neg p \equiv \text{F}$

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

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