

**Important Logical Equivalences**

$$\begin{aligned} p \wedge T &\Leftrightarrow p \\ p \vee F &\Leftrightarrow p \end{aligned}$$

Identity

$$\begin{aligned} p \vee T &\Leftrightarrow T \\ p \wedge F &\Leftrightarrow F \end{aligned}$$

Domination

$$\begin{aligned} p \vee p &\Leftrightarrow p \\ p \wedge p &\Leftrightarrow p \end{aligned}$$

Idempotent

$$\neg(\neg p) \Leftrightarrow p$$

Double negation

$$\begin{aligned} p \vee q &\Leftrightarrow q \vee p \\ p \wedge q &\Leftrightarrow q \wedge p \end{aligned}$$

Commutative

$$\begin{aligned} (p \vee q) \vee r &\Leftrightarrow p \vee (q \vee r) \\ (p \wedge q) \wedge r &\Leftrightarrow p \wedge (q \wedge r) \end{aligned}$$

Associative

$$\begin{aligned} p \vee (q \wedge r) &\Leftrightarrow (p \vee q) \wedge (p \vee r) \\ p \wedge (q \vee r) &\Leftrightarrow (p \wedge q) \vee (p \wedge r) \end{aligned}$$

Distributive

$$\begin{aligned} \neg(p \vee q) &\Leftrightarrow \neg p \wedge \neg q \\ \neg(p \wedge q) &\Leftrightarrow \neg p \vee \neg q \end{aligned}$$

DeMorgan's laws

$$\begin{aligned} p \vee \neg p &\Leftrightarrow T \\ p \wedge \neg p &\Leftrightarrow F \\ p \rightarrow q &\Leftrightarrow (\neg p \vee q) \end{aligned}$$

Useful Identities