

Logical Equivalences

$$p \wedge T \Leftrightarrow p; \quad p \vee F \Leftrightarrow p$$

$$p \vee T \Leftrightarrow T; \quad p \wedge F \Leftrightarrow F$$

$$p \vee p \Leftrightarrow p; \quad p \wedge p \Leftrightarrow p$$

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

$$p \vee q \Leftrightarrow q \vee p; \quad p \wedge q \Leftrightarrow q \wedge p$$

$$(p \vee q) \vee r \Leftrightarrow p \vee (q \vee r); \quad (p \wedge q) \wedge r \Leftrightarrow p \wedge (q \wedge r)$$

$$p \vee (q \wedge r) \Leftrightarrow (p \vee q) \wedge (p \vee r)$$

$$p \wedge (q \vee r) \Leftrightarrow (p \wedge q) \vee (p \wedge r)$$

$$\neg(p \vee q) \Leftrightarrow (\neg p \wedge \neg q)$$

$$\neg(p \wedge q) \Leftrightarrow (\neg p \vee \neg q)$$

$$p \vee \neg p \Leftrightarrow T$$

$$p \wedge \neg p \Leftrightarrow F$$

$$(p \rightarrow q) \Leftrightarrow (\neg p \vee q)$$

$$p \leftrightarrow q \Leftrightarrow (p \rightarrow q) \wedge (q \rightarrow p)$$

Other useful equivalences (not in the book)

$$p \vee (p \wedge q) \Leftrightarrow p; \quad p \wedge (p \vee q) \Leftrightarrow p$$

$$p \vee (\neg p \wedge q) \Leftrightarrow p \vee q; \quad p \wedge (\neg p \vee q) \Leftrightarrow p \wedge q$$

$$(p \wedge q) \vee (\neg p \wedge r) \vee (q \wedge r) \Leftrightarrow (p \wedge q) \vee (\neg p \wedge r);$$

$$(p \vee q) \wedge (\neg p \vee r) \wedge (q \vee r) \Leftrightarrow (p \vee q) \wedge (\neg p \vee r)$$

Identity Laws

Domination Laws

Idempotent Laws

Double Negation Law

Commutative Laws

Associative Laws

Distribution Laws

De Morgan's Laws

Miscellaneous

Or Tautology

And Contradiction

Implication Equivalence

Biconditional Equivalence

Absorption laws

Consensus laws (special)

Consensus laws (general)