Discrete Structures. CSCI-150. Spring 2014.

$$(a \wedge b) \equiv (b \wedge a) \qquad \text{commutativity of } \wedge$$

$$(a \vee b) \equiv (b \vee a) \qquad \text{commutativity of } \vee$$

$$((a \wedge b) \wedge c) \equiv (a \wedge (b \wedge c)) \qquad \text{associativity of } \wedge$$

$$((a \vee b) \vee c) \equiv (a \vee (b \vee c)) \qquad \text{associativity of } \vee$$

$$\neg(\neg a) \equiv a \qquad \text{double-negation elimination}$$

$$(a \to b) \equiv (\neg b \to \neg a) \qquad \text{contraposition}$$

$$(a \to b) \equiv (\neg a \vee b) \qquad \text{implication elimination}$$

$$(a \leftrightarrow b) \equiv (a \to b) \wedge (b \to a) \qquad \text{biconditional elimination}$$

$$\neg(a \wedge b) \equiv (\neg a \vee \neg b) \qquad \text{De Morgan's Law}$$

$$\neg(a \vee b) \equiv (\neg a \wedge \neg b) \qquad \text{De Morgan's Law}$$

$$(a \wedge (b \vee c)) \equiv (a \wedge b) \vee (a \wedge c) \qquad \text{distributivity of } \wedge \text{ over } \vee$$

$$(a \vee (b \wedge c)) \equiv (a \vee b) \wedge (a \vee c) \qquad \text{distributivity of } \vee \text{ over } \wedge$$

$$\frac{p}{p \vee q} \quad \text{``}\vee\text{-Introduction''} \qquad\qquad \frac{\neg q \quad p \to q}{\neg p} \quad \text{``Modus Tollens''}$$

$$\frac{p \quad q}{p \wedge q} \quad \text{``}\wedge\text{-Introduction''} \qquad\qquad \frac{p \to q \quad q \to r}{p \to r} \quad \text{``Hypothetical Syllogism''}$$

$$\frac{p \wedge q}{p} \quad \text{``}\wedge\text{-Elimination''} \qquad\qquad \frac{p \vee q \quad \neg q}{p} \quad \text{``Disjunctive Syllogism''}$$

$$\frac{p \quad p \to q}{q} \quad \text{``Modus Ponens''} \qquad\qquad \frac{p \vee q \quad \neg p \vee r}{q \vee r} \quad \text{``Resolution''}$$

$$\frac{\text{assuming } p, \text{ we infer } q}{p \to q} \quad \text{``}\to\text{-Introduction''} \text{ (Deduction theorem)}$$

$$\frac{\text{assuming } p, \text{ we infer a contradiction}}{\neg p} \quad \text{``Proof by contradiction''}$$