Equivalence Rules

Commutative:	$A \vee B \Leftrightarrow B \vee A$	$A \wedge B \Leftrightarrow B \wedge A$
Associative:	$(A \vee B) \vee C \Leftrightarrow A \vee (B \vee C)$	$(A \wedge B) \wedge C \Leftrightarrow A \wedge (B \wedge C)$
Distributive:	$A \vee (B \wedge C) \Leftrightarrow (A \vee B) \wedge (A \vee C)$	$A \wedge (B \vee C) \Leftrightarrow (A \wedge B) \vee (A \wedge C)$
Identity:	$A \vee \text{False} \Leftrightarrow A$	$A \wedge \text{True} \Leftrightarrow A$
Universal Bound:	$A \vee \text{True} \Leftrightarrow \text{True}$	$A \wedge \text{False} \Leftrightarrow \text{False}$
Negation:	$A \vee \sim A \Leftrightarrow \text{True}$	$A \wedge \sim A \Leftrightarrow \text{False}$
DeMorgan's:	$\sim (A \vee B) \Leftrightarrow \sim A \wedge \sim B$	$\sim (A \wedge B) \Leftrightarrow \sim A \vee \sim B$
Absorption:	$A \wedge (A \vee B) \Leftrightarrow A$	$A \vee (A \wedge B) \Leftrightarrow A$
Idempotent:	$A \vee A \Leftrightarrow A$	$A \wedge A \Leftrightarrow A$
Double Negation:	$\sim (\sim A) \Leftrightarrow A$	
Implication:	$A \rightarrow B \Leftrightarrow \sim A \vee B$	
Equivalence:	$A \leftrightarrow B \Leftrightarrow (A \rightarrow B) \wedge (B \rightarrow A)$	

Inference Rules

Modus ponens

$P \rightarrow Q$

P

$\therefore Q$

Modus tollens

$P \rightarrow Q$

$\sim Q$

$\therefore \sim P$

Conjunction

P

Q

$\therefore P \wedge Q$

Addition

P

$\therefore P \vee Q$

Simplification

$P \wedge Q$

$\therefore P$

$P \wedge Q$

$\therefore Q$

Hypothetical Syllogism

$P \rightarrow Q$

$Q \rightarrow R$

$\therefore P \rightarrow R$

Disjunctive Syllogism

$P \vee Q$

$\sim P$

$\therefore Q$

Contrapositive

$P \rightarrow Q$

$\therefore \sim Q \rightarrow \sim P$

$\sim Q \rightarrow \sim P$

$\therefore P \rightarrow Q$

Exportation

$(P \wedge Q) \rightarrow R$

$\therefore P \rightarrow (Q \rightarrow R)$

Inconsistency

P

$\sim P$

$\therefore Q$