

Rules of Inference

Rule	Meaning
Modus Ponens	$p, p \Rightarrow q, \text{ then } q$
Modus Tollens	$p \Rightarrow q, \neg q, \text{ then } \neg p$
Hypothetical Syllogism	$p \Rightarrow q, q \Rightarrow r, \text{ then } p \Rightarrow r$
Disjunctive Syllogism	$p \vee q, \neg p, \text{ then } q$
Addition	$p, \text{ then } p \vee q$
Simplification	$p \wedge q, \text{ then } p$
Conjunction	$p, q, \text{ then } p \wedge q$
Resolution	$p \vee q, \neg p \vee r, \text{ then } q \vee r$

Rules of Inference (Equivalence)

Name	Meaning	Twin
Tautology	$p \vee \neg p \equiv T$	
Contradiction	$p \wedge \neg p \equiv F$	
Double Negation	$\neg(\neg p) \equiv p$	
Contrapositive	$p \Rightarrow q \equiv \neg q \Rightarrow \neg p$	
Mutual Implication	$p \Leftrightarrow q \equiv (p \Rightarrow q) \wedge (q \Rightarrow p)$	
Exclusive-or	$p \oplus q \equiv (p \wedge \neg q) \vee (\neg p \wedge q)$	
Implication	$p \Rightarrow q \equiv \neg p \vee q$	
Idempotent	$p \vee p \equiv p$	$p \wedge p \equiv p$
Identity	$F \vee p \equiv p$	$T \wedge p \equiv p$
Domination	$T \vee p \equiv T$	$F \wedge p \equiv F$
Commutative	$p \vee q \equiv q \vee p$	$p \wedge q \equiv q \wedge p$
Associative	$(p \vee q) \vee r \equiv p \vee (q \vee r)$	$(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$
Distributive	$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$	$p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$
DeMorgan's	$\neg(p \wedge q) \equiv (\neg p \vee \neg q)$	$\neg(p \vee q) \equiv (\neg p \wedge \neg q)$
Absorption	$p \vee (p \wedge q) \equiv p$	$p \wedge (p \vee q) \equiv p$