

Conjunction			Disjunction			Implication		
p	q	$p \wedge q$	p	q	$p \vee q$	p	q	$p \Rightarrow q$
V	V	V	V	V	V	V	V	V
V	F	F	V	F	V	V	F	F
F	V	F	F	V	V	F	V	V
F	F	F	F	F	F	F	F	V

Law of noncontradiction $p \wedge \neg p \Leftrightarrow F$

Law of the excluded middle $p \vee \neg p \Leftrightarrow V$

Double Negation $\neg(\neg p) \Leftrightarrow p$

Commutativity
 Conjunction $p \wedge q \Leftrightarrow q \wedge p$

Disjunction $p \vee q \Leftrightarrow q \vee p$

Associativity
 Conjunction $(p \wedge q) \wedge r \Leftrightarrow p \wedge (q \wedge r)$

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

Neutral Element
 Conjunction $p \wedge V \Leftrightarrow p$

Disjunction $p \vee F \Leftrightarrow p$

Absorbing Element
 Conjunction $p \wedge F \Leftrightarrow F$

Disjunction $p \vee V \Leftrightarrow V$

Idempotence
 Conjunction $p \wedge p \Leftrightarrow p$

Disjunction $p \vee p \Leftrightarrow p$

Distributive Property
 Conjunction over Disjunction $p \wedge (q \vee r) \Leftrightarrow (p \wedge q) \vee (p \wedge r)$

Disjunction over Conjunction $p \vee (q \wedge r) \Leftrightarrow (p \vee q) \wedge (p \vee r)$

Transitive $(p \Rightarrow q) \wedge (q \Rightarrow r) \Rightarrow (p \Rightarrow r)$

Properties of Implication
 Implication and Disjunction $(p \Rightarrow q) \Leftrightarrow \neg p \vee q$

Negation $\neg(p \Rightarrow q) \Leftrightarrow p \wedge \neg q$

Contrapositive of an Implication $(p \Rightarrow q) \Leftrightarrow (\neg q \Rightarrow \neg p)$

Double implication $(p \Leftrightarrow q) \Leftrightarrow [(p \Rightarrow q) \wedge (q \Rightarrow p)]$

Properties of Equivalence
 Transitive $[(p \Leftrightarrow q) \wedge (q \Leftrightarrow r)] \Rightarrow (p \Leftrightarrow r)$

Negation $\neg(p \Leftrightarrow q) \Leftrightarrow [(p \wedge \neg q) \vee (q \wedge \neg p)]$

De Morgan's laws
 Negation of a Conjunction $\neg(p \wedge q) \Leftrightarrow \neg p \vee \neg q$

Negation of a Disjunction $\neg(p \vee q) \Leftrightarrow \neg p \wedge \neg q$

De Morgan's laws
 Negation of Universal Quantifier $\neg(\forall x, p(x)) \Leftrightarrow \exists x: \neg p(x)$

Negation of Existential Quantifier $\neg(\exists x: p(x)) \Leftrightarrow \forall x, \neg p(x)$