

Laws of Logic

- L1.** $\neg\neg p \Leftrightarrow p$ Law of Double Negation
- L2.** $\neg(p \vee q) \Leftrightarrow \neg p \wedge \neg q$ DeMorgan's Laws
 $\neg(p \wedge q) \Leftrightarrow \neg p \vee \neg q$
- L3.** $p \vee q \Leftrightarrow q \vee p$ Commutative Laws
 $p \wedge q \Leftrightarrow q \wedge p$
- L4.** $p \vee (q \vee r) \Leftrightarrow (p \vee q) \vee r$ Associative Laws
 $p \wedge (q \wedge r) \Leftrightarrow (p \wedge q) \wedge r$
- L5.** $p \vee (q \wedge r) \Leftrightarrow (p \vee q) \wedge (p \vee r)$ Distributive Laws
 $p \wedge (q \vee r) \Leftrightarrow (p \wedge q) \vee (p \wedge r)$
- L6.** $p \vee p \Leftrightarrow p$ Idempotent Laws
 $p \wedge p \Leftrightarrow p$
- L7.** $p \vee F_0 \Leftrightarrow p$ Identity Laws
 $p \wedge T_0 \Leftrightarrow p$
- L8.** $p \vee \neg p \Leftrightarrow T_0$ Inverse Laws
 $p \wedge \neg p \Leftrightarrow F_0$
- L9.** $p \vee T_0 \Leftrightarrow T_0$ Domination Laws
 $p \wedge F_0 \Leftrightarrow F_0$
- L10.** $p \vee (p \wedge q) \Leftrightarrow p$ Absorption Laws
 $p \wedge (p \vee q) \Leftrightarrow p$
- L11.** $p \leftrightarrow q \Leftrightarrow (p \rightarrow q) \wedge (q \rightarrow p)$
- L12.** $p \rightarrow q \Leftrightarrow \neg p \vee q$
- L13.** $p \rightarrow q \Leftrightarrow \neg q \rightarrow \neg p$

Rules of Inference

R1.	$\frac{p \quad p \rightarrow q}{\therefore q}$	Modus Ponens
R2.	$\frac{p \rightarrow q \quad q \rightarrow r}{\therefore p \rightarrow r}$	Law of the Syllogism
R3.	$\frac{p \rightarrow q \quad \neg q}{\therefore \neg p}$	Modus Tollens
R4.	$\frac{p \quad q}{\therefore p \wedge q}$	Rule of Conjunction
R5.	$\frac{p \vee q \quad \neg p}{\therefore q}$	Rule of Disjunctive Syllogism
R6.	$\frac{\neg p \rightarrow F_0}{\therefore p}$	Rule of Contradiction
R7.	$\frac{p \wedge q}{\therefore p}$	Rule of Conjunctive Simplification
R8.	$\frac{p}{\therefore p \vee q}$	Rule of Disjunctive Amplification
R9.	$\frac{p \wedge q \quad p \rightarrow (q \rightarrow r)}{\therefore r}$	Rule of Conditional Proof
R10.	$\frac{p \rightarrow r \quad q \rightarrow r}{\therefore (p \vee q) \rightarrow r}$	Rule for Proof by Cases
R11.	$\frac{p \rightarrow q \quad r \rightarrow s \quad p \vee r}{\therefore (q \vee s)}$	Rule of the Constructive Dilemma
R12.	$\frac{p \rightarrow q \quad r \rightarrow s \quad \neg q \vee \neg s}{\therefore \neg p \vee \neg r}$	Rule of the Destructive Dilemma