Laws of Boolean Algebra

double negation	$\neg(\neg p) \equiv p$
excluded middle	$p \vee \neg p \equiv \mathbb{T}$
contradiction	$p \wedge \neg p \equiv \mathbb{F}$
identity laws	$\mathbb{T} \wedge p \equiv p$ $\mathbb{F} \vee p \equiv p$
idempotent laws	$p \wedge p \equiv p$ $p \vee p \equiv p$
commutative laws	$p \wedge q \equiv q \wedge p$ $p \vee q \equiv q \vee p$
associative laws	$(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$ $(p \vee q) \vee r \equiv p \vee (q \vee r)$
distributive laws	$p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$ $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$
DeMorgan's laws	$\neg(p \wedge q) \equiv (\neg p) \vee (\neg q)$ $\neg(p \vee q) \equiv (\neg p) \wedge (\neg q)$

Rules for Predicate Logic

DeMorgan's laws	$\neg(\forall x P(x)) \equiv \exists x(\neg P(x))$ $\neg(\exists x P(x)) \equiv \forall x(\neg P(x))$
	$\forall x \forall y Q(x,y) \equiv \forall y \forall x Q(x,y)$ $\exists x \exists y Q(x,y) \equiv \exists y \exists x Q(x,y)$

Definitions

$p \to q \equiv \neg p \vee q$

$p \leftrightarrow q \equiv (\neg p \vee q) \wedge \neg q \vee p$

Rules of Deduction

Rule		
modus ponens	$p \to q$ p $\therefore q$	$\forall x(P(x) \to Q(x))$ $P(a)$ $\therefore Q(a)$
modus tollens	$p \to q$ $\neg q$ $\therefore \neg p$	$\forall x(P(x) \to Q(x))$ $\neg Q(a)$ $\therefore \neg P(a)$
law of syllogism	$p \to q$ $q \to r$ $\therefore p \to r$	
elimination	$p \vee q$ $\neg p$ $\therefore q$	$p \vee q$ $\neg q$ $\therefore p$
specialization	$p \wedge q$ $\therefore p$	$p \wedge q$ $\therefore q$
generalization	p $\therefore p \vee q$	q $\therefore p \vee q$
	p q $\therefore p \wedge q$	