Rules of Inference

Rule of Inference	Tautology	Name
p $p \to q$ $\therefore q$	$[p \wedge (p \to q)] \to q$	Modus Ponens (or Law of Detachment)
$\neg q$ $p \to q$ $\therefore \neg p$	$[\neg q \wedge (p \to q)] \to \neg p$	Modus Tollens (or Law of Contraposition)
$p \to q$ $q \to r$ $\therefore p \to r$	$[(p \to q) \wedge (q \to r)] \to (p \to r)$	Hypothetical Syllogism (or Law of Syllogism)
$p \vee q$ $\neg p$ $\therefore q$	$[(p \vee q) \wedge \neg p] \to q$	Disjunctive Syllogism
p $\therefore p \vee q$	$p \to (p \vee q)$	Addition
$p \wedge q$ $\therefore p$	$(p \wedge q) \to p$	Simplification
p q $\therefore p \wedge q$	$[(p) \wedge (q)] \to (p \wedge q)$	Conjunction
$p \vee q$ $\neg p \vee r$ $\therefore q \vee r$	$[(p \vee q) \wedge (\neg p \vee r)] \to (q \vee r)$	Resolution

Rules of Inference for Quantified Statements

Rule of Inference	Name
$\forall x P(x)$ $\therefore P(c)$	Universal Instantiation
$P(c)$ for an arbitrary c $\therefore \forall x P(x)$	Universal Generalization
$\exists x P(x)$ $\therefore P(c)$ for some c	Existential Instantiation
$P(c)$ for some c $\therefore \exists x P(x)$	Existential Generalization