Rules of Inference and Quantification

Rule of Inference	Tautology	Name
p / $\therefore p \vee q$	$p \rightarrow (p \vee q)$	Addition
$p \wedge q$ / $\therefore p$	$(p \wedge q) \rightarrow p$	Simplification
p / q / $\therefore p \wedge q$	$((p) \wedge (q)) \rightarrow (p \wedge q)$	Conjunction
p / $p \rightarrow q$ / $\therefore q$	$[p \wedge (p \rightarrow q)] \rightarrow q$	Modus Ponens
$\neg q$ / $p \rightarrow q$ / $\therefore \neg p$	$[\neg q \wedge (p \rightarrow q)] \rightarrow \neg p$	Modus Tollens
$p \rightarrow q$ / $q \rightarrow r$ / $\therefore p \rightarrow r$	$[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$	Hypothetical Syllogism
$p \vee q$ / $\neg p$ / $\therefore q$	$[(p \vee q) \wedge \neg p] \rightarrow q$	Disjunctive Syllogism

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