

# Rules of Inference

Rules of Inference	Tautology	Name
$\begin{array}{c} p \rightarrow q \\ p \\ \hline \therefore q \end{array}$	$[p \wedge (p \rightarrow q)] \rightarrow q$	Modus ponens
$\begin{array}{c} \neg q \\ p \rightarrow q \\ \hline \therefore \neg p \end{array}$	$[\neg q \wedge (p \rightarrow q)] \rightarrow \neg p$	Modus tollens
$\begin{array}{c} p \rightarrow q \\ q \rightarrow r \\ \hline \therefore p \rightarrow r \end{array}$	$[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$	Hypothetical syllogism
$\begin{array}{c} (p \vee q) \\ \neg p \\ \hline \therefore q \end{array}$	$[(p \vee q) \wedge \neg p] \rightarrow q$	Disjunctive syllogism
$\begin{array}{c} P \\ \hline \therefore (p \vee q) \end{array}$	$p \rightarrow (p \vee q)$	Addition
$\begin{array}{c} (p \wedge q) \\ \hline \therefore p \end{array}$	$(p \wedge q) \rightarrow p$	Simplification
$\begin{array}{c} p \\ q \\ \hline \therefore (p \wedge q) \end{array}$	$[(p) \wedge (q)] \rightarrow (p \wedge q)$	Conjunction
$\begin{array}{c} (p \vee q) \\ (\neg p \vee r) \\ \hline \therefore (p \vee r) \end{array}$	$[(p \vee q) \wedge (\neg p \vee r)] \rightarrow (p \vee r)$	Resolution

