

Notation – Laws of Inference

We're using the " $\rightarrow$ " symbol A LOT.

Too much

Some new notation to make our lives easier.

If we know both A and B	A, B
$\therefore$ We can conclude any (or all) of C, D	$\therefore C, D$

" $\therefore$ " means "therefore" – I knew A, B therefore I can conclude C, D .

$\frac{p \rightarrow q, p}{q}$	Modus Ponens, i.e. $[(p \rightarrow q) \wedge p] \rightarrow q$, in our new notation.
--------------------------------	---

Try it yourselves

Suppose you know $p \rightarrow q$, $\neg s \rightarrow \neg q$, and p .
Give an argument to conclude s .

[Pollev.com/robbie](https://pollev.com/robbie)

Help me adjust my explanation!

Inference Rules

$$\begin{array}{c} \text{Eliminate } \wedge \\ \hline A \wedge B \\ \hline \therefore A, B \end{array}$$

$$\begin{array}{c} \text{Eliminate } \vee \\ \hline A \vee B, \neg A \\ \hline \therefore B \end{array}$$

$$\begin{array}{c} \text{Intro } \wedge \\ \hline A, B \\ \hline \therefore A \wedge B \end{array}$$

$$\begin{array}{c} \text{Intro } \vee \\ \hline A \\ \hline \therefore A \vee B, B \vee A \end{array}$$

$$\begin{array}{c} \text{Direct Proof rule} \\ \hline A \Rightarrow B \\ \hline A \rightarrow B \end{array}$$

$$\begin{array}{c} \text{Modus Ponens} \\ \hline P \rightarrow Q, P \\ \hline \therefore Q \end{array}$$

You can still use all the propositional logic equivalences too!

Try it!

Given: $p \vee q, (r \wedge s) \rightarrow \neg q, r$.
Show: $s \rightarrow p$

$$\begin{array}{c} \text{Eliminate } \wedge \\ \hline A \wedge B \\ \hline \therefore A, B \end{array}$$

$$\begin{array}{c} \text{Eliminate } \vee \\ \hline A \vee B, \neg A \\ \hline \therefore B \end{array}$$

$$\begin{array}{c} \text{Intro } \wedge \\ \hline A; B \\ \hline \therefore A \wedge B \end{array}$$

$$\begin{array}{c} \text{Intro } \vee \\ \hline A \\ \hline \therefore A \vee B, B \vee A \end{array}$$

$$\begin{array}{c} \text{Direct Proof rule} \\ \hline A \Rightarrow B \\ \hline A \rightarrow B \end{array}$$

$$\begin{array}{c} \text{Modus Ponens} \\ \hline P \rightarrow Q; P \\ \hline \therefore Q \end{array}$$

You can still use all the propositional logic equivalences too!