

Inference Rules

$$\begin{array}{c} \boxed{\text{Eliminate } \wedge} \quad \frac{A \wedge B}{\therefore A, B} \end{array}$$

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

$$\begin{array}{c} \boxed{\text{Intro } \wedge} \quad \frac{A, B}{\therefore A \wedge B} \end{array}$$

$$\begin{array}{c} \boxed{\text{Intro } \vee} \quad \frac{A}{\therefore A \vee B, B \vee A} \end{array}$$

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

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

You can still use all the propositional logic equivalences too!

Try it!

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

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

$$\begin{array}{c} \boxed{\text{Intro } \wedge} \quad \frac{A; B}{\therefore A \wedge B} \end{array}$$

$$\begin{array}{c} \boxed{\text{Intro } \vee} \quad \frac{A}{\therefore A \vee B, B \vee A} \end{array}$$

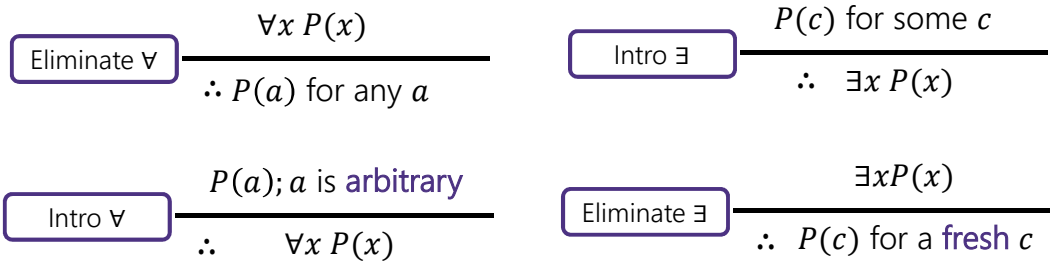
$$\begin{array}{c} \boxed{\text{Direct Proof rule}} \quad \frac{A \Rightarrow B}{A \rightarrow B} \end{array}$$

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Proof Using Quantifiers

Suppose we know $\exists x P(x)$ and $\forall y [P(y) \rightarrow Q(y)]$. Conclude $\exists x Q(x)$.



Divides

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For integers x, y we say $x|y$ (" x divides y ") iff there is an integer z such that $xz = y$.

Which of these are true?

$2|4$

$4|2$

$2|-2$

$5|0$

$0|5$

$1|5$