Quantifiers

We have two extra symbols to indicate which way we're using the variable.

1. The statement is true for every x, we just want to put a name on it.

$\forall x\ (\mathrm{p}(\mathrm{x}) \land q(x))$ means "for every x in our domain, $p(x)$ and $q(x)$ both evaluate to true."

2. There's some x out there that works, (but I might not know which it is, so I'm using a variable).

$\exists x(p(x) \land q(x))$ means "there is an x in our domain, such that $p(x)$ and $q(x)$ are both true.

Translations

"For every x, if x is even, then $x = 2$."

"There are x, y such that $\mathrm{x} < y$."

$\exists x\ (\mathtt{Odd}(x) \land \mathtt{LessThan}(x, 5))$

$\forall y\ (\mathrm{Even}(y) \land \mathrm{Odd}(y))$

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Help me adjust my explanation!

Try it yourselves

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

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Help me adjust my explanation!

Inference Rules

Eliminate ∧
$$\frac{A \wedge B}{\therefore \quad A, B}$$

Eliminate ∨
$$\frac{A \vee B, \neg A}{\therefore \quad B}$$

Intro ∧
$$\frac{A, B}{\therefore \quad A \wedge B}$$

Intro ∨
$$\frac{A}{\therefore A \vee B, B \vee A}$$

Direct Proof rule
$$\frac{A \Rightarrow B}{A \to B}$$

Modus Ponens
$$\frac{P \to Q, P}{\therefore \quad Q}$$

You can still use all the propositional logic equivalences too!