Why

We want to make conclusions.

Discussion

A *conclusion* is a statement that holds necessarily as a consequence of other statements. We have a list of quantified logical statements, and we call them *premisses*. We want to state which other statements hold necessarily if the premisses hold. A sequence of statements, each of which follows from the previous, ending with a *conclusion* is called a *proof* of the conclusion. The process is *deduction*. A *deduction* is a statement which follows necessarily from other premisses.

A *proposition* is another term for a statement. An unproven statement (or premiss) is also called a *principle*. We will often set apart propositions and principles from the text. We bold them and label them with Arabic numerals (see Letters) to enable us to reference them.

Examples

Since principles have no proofs, they will look like

Principle 1. *(Here is where the statement would go).*

Since propositions have proofs, but are used like principles, they will appear stated first, and followed by their proof.

Proposition 1. *(Here is where the statement would go).*

Proof. (Here is the where the account would go). □

Methods of proof

We outline a few of the methods of proof used in this text.

Forward reasoning

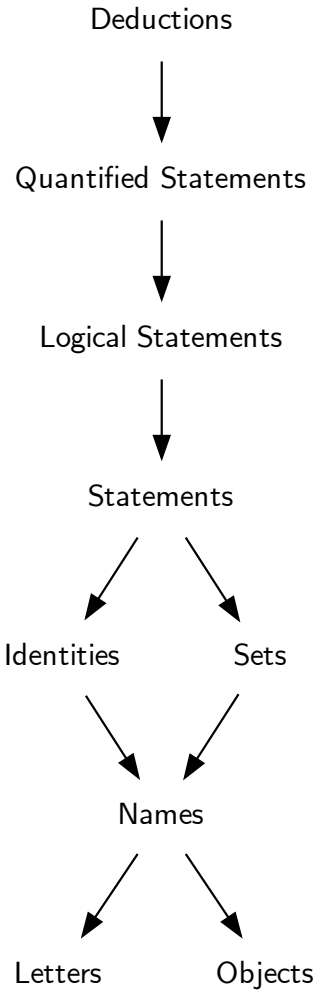
If we have as premisses that a statement P implies a statement Q, and we have P, then we have Q. It is common that this reasoning is done in chains. P implies Q, and Q implies R. So if we have P then we have Q and if we have Q then we have R. So in other words, we can also deduce that P implies R.

Contradiction

A contradiction occurs when we can deduce a statement and its opposite from the same premisses. If we can deduce a contradiction when we append to a list of premisses a given premiss we can conclude that the given premiss is false.

Terms

To make propositions and principles easy to state, we will often introduce new terms. Doing so is a process of *definition*. These definitions are abbreviations for more complicated to explain objects or properties of objects. In other words, all definitions are *nominal*, which means that they just name things which are already known to exist. They are made to give us language and to save space. When we are defining a term, we will put it in italics.


Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects