

BASIC RULES OF MATH 101

Rules of language

- (1) Never say “infinitely small” or “infinitely large.”
- (2) Never say anything is clear, easy, or obvious.
- (3) Never assume what you want to prove and work backwards.

Types of proofs

- (1) Don't use contradiction if it is easier to prove your result directly.
- (2) Only use induction to prove something for finite sets or for the natural numbers.
- (3) If you want to prove that something exists, then either you give the reader a method for creating it or you assume no such object exists and do it by contradiction.

Declaring variables

- (1) Always declare a variable before you use it.
- (2) If there is more than one variable in a statement, then the variables must be declared in the order they occur in the statement.
- (3) The symbol \exists declares a variable if the variable does not depend on a \forall or an *if* that occurs before it in the sentence.
- (4) \forall and *if* only declare a variable for one sentence. If you want to use the variable later you should declare it with “Let.”
- (5) If you are proving something is true $\forall x \in S$, then you must start with “Let $x \in S$ be given.” This means that x is an arbitrary element of S . You cannot then assume that x has a particular form.