

What To Look For When Reading A Proof

by L. Shorser

In order to understand and effectively use the results of a mathematical proof, there are a number of aspects to notice as you read. Here are some of the most important:

- structure
- assumptions
- definitions and other results used
- scope

Structure: The structure of a proof is the method(s) or strategy/strategies being employed. For example, a proof might be an argument that makes a false statement and then, from that statement, generates a contradiction. That would prove that the original statement was false. Or the proof may be structured into an induction argument. Various proof structures will be discussed in other handouts.

Assumptions: Assumptions are statements that need to be true for the rest of the argument to work. For example, in order to prove a statement about all proper fractions $\frac{r}{s}$, it must first be assumed that r and s are integers such that r is less than or equal to s . If being proper is not important to the proof, then the second assumption ($r \leq s$) might not be included.

Definitions and Other Results: When proving a property of prime numbers, the definition of primes will probably be used either implicitly or explicitly. It is important to notice which definitions and which form of those definitions are in use. For example, a proof that involves parallel lines may describe them as lines in the plane that never intersect. Alternatively, the proof may refer to parallel lines as lines in the plane with the same slope. The first definition does not include the possibility of two copies of the same line, unlike the second definition. Other results that might be mentioned in the proof include theorems, statements that have already been proven elsewhere, etc..

Scope: The scope is the set for which the statement is being proven. At the end of the proof, do we now know something about all real numbers or a different set of numbers? If the set is different, is it a subset of the real numbers? The scope could also be a set of functions, geometric shapes, abstract sets, etc.