

Restrictions

These are the restrictions that need to be followed when writing text in the natural formal language described in the accompanying documents. Some of these restrictions are permanent; others are removable, and are in place to simplify an initial implementation of the compiler.

Reference Only Mathematical Objects and Results. The only things which we are allowed to refer to are mathematical objects and results. So, for example, we cannot refer to 'uniqueness', 'conjugation' or 'multiplication'. We may refer to 'the fact that $e * e = e$ ' like a result, but we may not refer to ' $e * e = e$ ' as an equation which we can scale, extract the LHS of, etc. .

Pronouns Refer to Objects. Pronouns may only refer to mathematical objects, not results. (So e.g. 'this shows... ' is not allowed.)

Define Mathematical Terms. Mathematical terms may only be used if they have been defined. The system understands plurals (i.e. that 'group' and 'groups' refer to the same concept) but no other relationships between words. (For example, 'containing' is not understood as a derivative of 'contain(s)').

Fragment Vocabulary. There is a fixed vocabulary of extramathematical terms. (The 'fragment vocabulary'.)

Bind Variables. Every variable used must be explicitly bound. (Note that the binding domains of some constructions, such as 'if G is a group, ...' may be longer than an analogy with logic suggests.)

No Compound Variable Introductions. Compound object descriptions may not be used in 'let's or other statements that introduce variables. So e.g. 'let $G \times H$ be a product of groups' and 'Let $Na \in G/N$ ' are illegal.

Truth-Conditional Content. Only arguments with truth-conditional content may be made. This rule excludes:

1. Informal comments — e.g. 'Given a homomorphism f , one must always salivate, like Pavlov's dog, by asking for its kernel and image'. (Such material may of course be placed in comments.)
2. Valid mathematical material which is difficult to translate into logic — e.g. 'Both sides of the first (or second) equations arise from an expression having $m + n$ (or mn) factors all equal to a . But these expressions need no parentheses, by Theorem 1.8.'

(Both examples taken from Rotman.)

No Parentheses. Parentheses may not be used with English text, but only with symbolic material. (This is a deliberate stylistic restriction, rather than a technically motivated one.)

No Square Brackets. Square brackets may only be used for comments.

Linear Rhetorical Structure. The argument must flow forwards, sentence by sentence. (So 'P. Because Q.' is illegal. We must either use one sentence, as in 'P because Q.', or rewrite using an extra result, as in 'Claim. P. Proof. Q.')

Potential Definitions are Read as Definitions. For example, ‘define’ should not be used to introduce variables: ‘Define H to be ...’ would be taken as a definition rather than a variable introduction. (However, ‘Let f be the function from X to Y defined by ...’ is fine.) Similarly for ‘Denote X by Y ...’ and ‘Write P for Q ’.

No Definitions in Passing. One cannot introduce a term or piece of notation by adding a relative clause to a non-definitional assertion. So e.g. ‘If $N \triangleleft G$, then the cosets of N in G form a group, *denoted by* G/N , of order $[G : N]$.’ is disallowed. The definition should be extracted into a separate statement.

One may not define symbolic notation using ‘=’ on its own. (As in ‘We define $ST = st : s \in S$ and $t \in T$ ’.) Some English word or item of punctuation must separate the definiens and definiendum.

Separate symbolic and textual definienda. If both symbolic notation and textual terms are being defined, they cannot be placed immediately next to each other; at least one word or token must intervene. So ‘the **conjugate** gHg^{-1} ...’ is illegal.

Singular ‘the’ is always taken to refer to unique objects. (Qualification: missing PPs can be filled in given sufficient context. So if one has defined H as ‘a subgroup of G ’, then one may later speak of ‘the subgroup H ’; this is automatically expanded to ‘the subgroup H of G ’.)

Avoid Double Definitions. It’s not illegal as such to define the same terms or notation twice, but if you do so you are required to assert that that notation is unambiguous. It is simplest to avoid double definitions.