

Mathematical English

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References

General writing

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Mathematical writing

journal articles

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web documents

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- [12] Ashley Ricker, *Writing a Research Paper in Mathematics*, <http://web.mit.edu/jrickert/www/mathadvice.html>.
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1 Quotations about Writing

Warning: This author needs to read a copy of Strunk and White and take the advice of good writing at heart –a referee

The time to begin writing an article is when you have finished it to your satisfaction. By that time you begin to clearly and logically perceive what it is you really want to say. – Mark Twain

The wastebasket is a writer's best friend. – Isaac Bashevis Singer

Easy reading is damn hard writing. – Nathaniel Hawthorne

Style takes its final shape more from attitudes of mind than from principles of composition, for, as an elderly practitioner once remarked, "Writing is an act of faith, not a trick of grammar." ... Style is the writer. –Strunk and White

I think I can tell someone how to write, but I can't think who would want to listen – P.R. Halmos

Defend your style – P.R. Halmos

Word-smithing is a much greater percentage of what I am supposed to be doing in life than I would ever have thought – Donald Knuth

It strikes me that mathematical writing is similar to using a language. To be understood you have to follow some grammatical rules. However, in our case, nobody has taken the trouble of writing down the grammar; we get it as a baby does from parents, by imitation of others. Some mathematicians have a good ear; some

not (and some prefer the slangy expressions such as "iff"). That's life. – Jean-Pierre Serre

When writing about transcendental issues, be transcendently clear. – René Descartes

In order to translate a sentence from English into French two things are necessary. First, we must understand thoroughly the English sentence. Second, we must be familiar with the forms of expression peculiar to the French language. The situation is very similar when we attempt to express in mathematical symbols a condition proposed in words. First, we must understand thoroughly the condition. Second, we must be familiar with the forms of mathematical expression. – George Polya

<http://www.quotegarden.com/writing.html>

2 Rough structure of the lecture

1. General writing instructions (follow closely Strunk and White)
2. Mathematical writing instructions (including some hints on mathematical publishing)
3. L^AT_EX-nical writing instructions (if time permits)

3 General writing instructions

(see Strunk and White)

4 Mathematical writing

4.1 WHAT IS MATHEMATICAL WRITING?

1. Writing where mathematics is used as a primary means for expression, deduction, or problem solving.
2. Math writing combines two languages (natural and math)
 - Natural language is rich and allows for ambiguity
 - Math language is concise and must be unambiguous
3. Math writing requires slow reading
 - Often expresses complex ideas
 - Often must be read and pondered several times
 - Often is used as reference
 - Usually must be read selectively and in pieces
4. Very hard to teach to others (“Effective exposition is not a teachable art. There is no useful recipe” Halmos)
5. reflects personal style

4.2 RULES OF WRITING

Basic rules, according to your intended interaction:

1. Have mercy on the reader,
2. Have mercy on the editor/publisher, and, last but not least,
0. Have mercy on the author (i.e., yourself and/or your coauthors)

According to their scope, we can distinguish (not exclusively) between

1. Local rules
 - Apply to a single sentence (e.g., sentence structure rules mathspeak rules, comma rules, etc), or
 - to multiple consecutive sentences (e.g., join or break sentences)

- Are verifiable
2. Global rules (our focus in this talk)
 - Apply to the entire document
 - General style and writing strategy rules
 - Those concerning linguistic organization are mostly non-verifiable (e.g., organize well, be clear and concise, etc) or at least controversial (what is a good reference, example?; how much is a good explanation?)
 - Those concerning mathematics must be verifiable (Consistency rules, flow of arguments in proofs etc.)

EXAMPLES OF LOCAL RULES

1. Break up long sentences into simple ones
2. Mathspeak should be "readable"
 - BAD: "Let $k > 0$ be an integer."
 - GOOD: "Let k be a positive integer" or "Consider an integer $k > 0$."
 - BAD: "Let $x \in R^n$ be a vector."
 - GOOD: "Let x be a vector in R^n " or "Consider a vector $x \in R^n$."
3. Don't start a sentence with mathspeak
 - BAD: Proposition: f is continuous.
 - GOOD: Proposition: The function f is continuous.
4. Use active voice ("we" is better than "one")
5. Minimize "strange" symbols within text
6. Make proper use of "very," "trivial," "easy," "nice," "fundamental," etc
7. Use abbreviations correctly (e.g., cf., i.e., etc.)
8. Comma rules
9. "Which" and "that" rules
10. ...

EXAMPLES OF GLOBAL RULES

1. Language rules/goals to strive for: precision, clarity, familiarity, conciseness, fluidity

2. Organizational rules (how to structure your work, how to edit, rewrite, proofread, etc)
3. Down with the irrelevant and the trivial (Halmos)
4. Honesty is the best policy (Halmos)
5. Defend your style (against copyeditors - Halmos)
Consistency rules (be boring creatively)
6. Use consistent notation and nomenclature
7. State results consistently
8. Don't underexplain - don't overexplain

Readability rules (make it easy for the reader)

9. Explain your goals and the status of all claims
10. Use suggestive references
11. Consider examples and counterexamples
12. Use visualization when possible
13. ...

4.3 GENERAL STRUCTURING RULES

1. Typically a paper consists of title, abstract, introduction, body, and list of references.
2. A strong title identifies the general area of the subject and its most distinctive features. It helps locating the content of the paper in the body of mathematics. Include well-known keywords
 - BAD: "Concerning a certain application of a theorem of J. Doe"
 - GOOD: "Algebraic properties of bounded operators"

Title should not be too long (say, more than 12 words, as otherwise often misspelled, misquoted) and not serve as an inflated advertisement.

3. Abstract identifies the subject (a table of contents in a paragraph of prose); no general background material here
4. start introduction strong; explain your subject and results and how you'll present them
5. In the list of references, give the full page numbers of each article appearing in a journal, a proceedings volume, or other collection; do not give the numbers of the particular pages cited in the text. (see also "Use suggestive references" section)
6. body contains main material (motivational discussions, definitions, results, proofs)
7. main reasons for dividing the body into sections:
 - the division indicates the strategy of your presentation
 - it allows readers to quickly and easily find the information that interests them;
 - indicates a breakpoint in the readers' lecture
8. It is often helpful to begin a new section of the paper with a summary of the general setting.
9. A "theorem" is a major result, one of the main goals of the work. Use the term "theorem" sparingly.
10. Call a minor result a "proposition" if it is of independent interest.
11. Call a minor result a "corollary" if it follows with relatively little proof from a theorem, a proposition, or another corollary.
12. "Corollary" is considered less important than "proposition".
13. Call a subsidiary statement a "lemma" if it is used in the proof of a theorem, a proposition, or another lemma.
14. A formal definition should simply introduce some terminology or notation; there should be no accompanying discussion of the new terms or symbols.
15. A formal remark should be a brief comment made in passing; the main discussion should be logically independent of the content of the remark.
16. Often it is better to embed definitions and remarks into the general discussion rather than setting them apart formally.