

Writing Math

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Abstract

Credits: 1

Level: Intermediate

Prerequisite: Several math classes or permission of instructors

Location: Sci217

Times: Friday 8.30–9.20am

Website: http://cs.marlboro.edu/courses/fall2014/writing_math/home

1 Introduction

This is a course about writing mathematics (you may have guessed this from the title). We will start by looking at the typesetting package \LaTeX and move on from there to think about:

1. math-specific rules of grammar (for example, don't start a sentence with a formula);
2. how to write proofs;
3. how to select a good example;
4. how to structure a math paper.

Tangents include:

- bibliographies and references;
- math presentations.

2 \LaTeX

When writing \LaTeX , imagine that you are back in the olden days. The 1970s, say. To produce a mathematical document you would write it by hand, explaining the logical structure of the text in the margins as you went. You would send this to a typesetter who would turn

it into a well-formatted printed document. You will write \LaTeX files as plaintext files, with the logical structure explained. \LaTeX will then do the typesetter’s job for you.

For example, if you want the greek letter α to appear in a mathematical formula, you type “ $\backslash\alpha$ ”. \LaTeX will do the rest. You can also produce almost any mathematical symbols, as shown in Example 1.

Example 1 *Here are three lines of displayed math.*

$$\{n \in \mathbb{Z} : n \geq 2\}$$

$$\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{1}{k^2} = \frac{\pi^2}{6}$$

$$[\eta] \subseteq \mathbb{R}^n \doteq \clubsuit \dots \perp \Rightarrow \hat{A}, \omega \in \Omega, a^{(b^c)} \neq (a^b)^c, \frown, \odot \vee \pm \infty$$

Which is the odd one out?

The source file for this document is available on the class website. I’ve included many of the common \LaTeX tricks and structures that you’ll need to master. The easy way to get started is to play with the details and worry about the necessary global structure of the file later. There is also a useful online guide to using \LaTeX :

www.tex.ac.uk/tex-archive/info/lshort/english/lshort.pdf

3 Writing

\LaTeX will make your output look impressive. However:

Theorem 1 *Beautifully typeset nonsense is still nonsense.*

Proof: See the last line of displayed math in Section 2. \square

Theorem 1 must be borne in mind at all times—typesetting an incorrect solution will not make it any more correct.

Open a math book or paper at random and you’ll see that the words massively outweigh the formulæ or calculations. Now look at a sheet of your math homework. I bet the opposite is true. Most of our time will be spent working on the words: how to structure a math paper (or plan), what makes for a valid proof (and what makes for a *good* proof), the importance of a well-chosen example, how to cite the work of others, why mathematical writers so often use the first-person plural, and much more.

Through the semester we’ll give you several articles to read about the stylistic aspects to writing math and in particular we’ll read most of [1]. We’ll also read and discuss some of our own mathematical writing as a group.

4 Academic Integrity

You are expected to be aware of the college's policy on academic integrity and to abide by it. It can be found on the college website, and is linked from the course website. In particular, be careful not to “double-dip”. While close links to your work outside this class are strongly encouraged, any work you do cannot count for credit twice. Please come and talk to me if anything is unclear.

References

- [1] D. E. Knuth, T. Larrabee, P. M. Roberts, *Mathematical Writing*, MAA Notes (1996).