

DOCUMENTING YOUR WRITTEN WORK

January 2, 2011

Communication is difficult; effective written technical communication is close to an art form.

The most basic rules for writing mathematics are no different than for any other subject that requires careful documentation, but there are some extra rules for weaving mathematical formulas and symbols into the text. Moreover, different circumstances often require different documentation formats; for example, in this course, there will be some special formatting rules for homework. For the most part, we shall deal with the particulars of in-class exams later as the need arises.

REQUIREMENTS FOR FORMATTING HOMEWORK

Homework that fails to meet the requirements below will be marked “U” (“unacceptable”) and returned unread.

Put the following information, on separate lines, in the upper right-hand corner (or as near to it as you can get using your typesetting program) of the first page: Your name; “Math 366, 13:30”; and “Instructor: C. Miller” (so that if you lose it and some nice person finds it and turns it in to the Math Department, then I will get it). On the first line of the document proper, list the exercises that were assigned to be turned in. See the sample homework on the course web pages for visual details.

Leave at least standard-sized margins: 1" on the sides, $1\frac{1}{4}$ " top and bottom, aside from very occasional overspill. (If you don't, where is your instructor or grader supposed to make comments on your work?) I strongly recommend that you use standard letter-size paper ($8\frac{1}{2}$ " \times 11"). If you prefer, you may use smaller paper, but it is your responsibility to do whatever is necessary to make your work neat and legible, (including leaving standard-sized margins). If you use a word processor or typesetting program, and print from PDF using Adobe Reader, make sure that page scaling is set to “None” (so it doesn't shrink the size

of the type). Also, I recommend unchecking “Auto-rotate and center”. In general, take charge of producing your documents; software defaults aren’t always designed in the best interests of the end user.

Use “portrait” mode, not “landscape”. (If you don’t know what these mean, then you are probably already using portrait mode.)

If you use a spiral-bound notebook for preparing homework, then trim off all the shredded rubbish that is created by tearing out the page. I don’t like having to clean it up after it flutters down onto the carpet in my study.

Either use high-quality paper or write on only one side of each sheet of paper. Much of the paper being sold on and around campus is of rather low quality. If you choose to work two sided, make sure that you are not getting any bleed- or press-through.

Staple all work that is more than one page long. I recommend that you purchase a stapler such as a Swingline Tot. Do not rely on finding OSU-owned staplers on campus that actually work.

If your handwriting is difficult to read, and you are either unwilling or unable to make it easily readable, then use a typewriter, a word processor, or a typesetting program, *e.g.*, MS Equation Editor or some variety of T_EX (see links on the home page). I am the judge of whether your handwriting is legible or not, but often you can find out just by showing your work to a friend or classmate and asking for an honest appraisal.

Do not cramp your work: an extra sheet or two of paper is a small price to pay for improved readability. This includes the size of your handwriting, and horizontal and vertical spacing. If you use lined paper, you are probably going to have to skip lines, at least, much of the time. If you use a word processor, use at least 12 point (or an equivalent magnification factor) type and 1½ line spacing (as in this document).

See the last section below for some special rules regarding T_EX.

GENERAL GUIDELINES

Above all: Say what you mean. Mean what you say. Aim to make your work impossible to be misunderstood, rather than merely possible to be understood.

Write so that you can be easily understood by a properly-trained, English-reading individual. In particular, this means that you must produce complete sentences that make clearly identifiable statements, with clear meanings, that can be understood by any qualified reader. Rules of formal English grammar, including those of spelling and punctuation, should be obeyed. Non-native speakers of English will receive some special consideration. I can usually tell the difference between sloppy writing and a non-native speaker having difficulty with, say, the conjugation of an irregular verb.

Always proofread your work before turning it in. Ideally, you should read and reread and revise almost any formal communication. (I have rewritten and revised this document several times; I am not yet happy with it.) Neatness and clarity count, as you well know if you've tried to read any complicated document.

If you have to cross out many words on a particular page, then you should rewrite the whole anew, cleanly and neatly. If you are not willing to spend some of your time doing this—if what you hand in shows that you were in a hurry and that you did not make the effort to write things neatly and properly—then there is little reason for readers to spend their time trying to read what you wrote.

Do not assume that readers of your work can read your mind. Do assume that they are intelligent, probably busy, and will not spend their valuable time trying to read though sloppy presentation or unclear content. If your work is poorly written, illegible, has many words crossed out, or is anything that you would be ashamed to hand in, say, if you were writing a letter to apply for a job, then this is a form of disrespect towards the reader; you should not be surprised if the reader takes it that way.

Most of the above applies to any serious academic work.

You may use cursive handwriting if you prefer, but this usually entails extra care.

You may use either pen or pencil, but special care must be taken to avoid smearing when using pencil, especially soft leads like #2, or inexpensive ball-point pens. For exams, I strongly recommend pencil or erasable pen, to prevent filling up allotted space with crossed-out mistakes.

MATHEMATICS

As the course progresses, we shall deal more carefully with the development of mathematical exposition. For now, I make only a few remarks.

The first letter of the first word of a sentence must be capitalized. Capitalization of other letters within a sentence must be done according to usual rules of mathematics and English grammar. The end of a sentence must be marked by a period. Clauses within sentences must be punctuated according to the usual rules of English grammar (commas, semicolons, colons, etc). Dependent clauses are not sentences. Sentences must be organized into paragraphs. The beginning of a paragraph is signified by indentation. For further information, consult any decent book on academic writing.

Always explain what you are doing. In particular, always identify clearly that which you intend to prove (or disprove, as the case may be) as well as the proof.

Provide proper connectives between equations as well as between ideas.

Do not invoke theorems or facts that you might know from more advanced math courses.

Avoid exaggerated, cryptic or incorrect use of mathematical notation. Inexperienced writers should avoid inventing their own notation; it might easily contravene standard usage or conventions. If you have any questions about notation or how to use it, ask me. Do not use \times or asterisks ($*$ or $*$) to indicate multiplication. Do not use \emptyset (or \varnothing) to denote the numeral 0. Do not use “slash notation” for fractions (*i.e.*, the form a/b) unless you are using a word processor or mathematical typesetting program (and even then, only sparingly). Do not write or say that two things are equal ($=$) unless they are.

USING T_EX

There is no requirement, nor even encouragement, that you use T_EX for homework. But if you do, then you must learn to do it properly.

Plain T_EX. You need to be pretty good at it in order to produce decent math. If you are not all that good, then I strongly suggest that you start using $\mathcal{A}\mathcal{M}\mathcal{S}$ -L^AT_EX (which is designed specifically for producing math).

$\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$. Go to <http://www.ams.org/tex/amslatex.html>. How much of the documentation you need depends on how much you already know and how motivated you are.

Plain $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$. I have never bothered to learn how to use this, since $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ was designed for doing math (and specifically for typesetting AMS journals).

I use $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ with `amsart`. Below is how I produce 12 point type and 1-1/2 line spacing with tolerable margins (but I have no objection to *wider* margins). I don't know if these commands work without `amsart`.

```
\documentclass[12pt]{amsart}
\usepackage{amssymb,latexsym}
\pagestyle{plain}
\setlength{\textwidth}{6.4in}
\setlength{\textheight}{8.5in}
\setlength{\hoffset}{-.7in}
\setlength{\voffset}{-.4in}
\renewcommand{\baselinestretch}{1.5}
```

(Your user commands follow.)

Here is how I produce the upper-right corner info for homework (but there are probably other ways to do it). Right after `\begin{document}`, put:

```
\hfill
\begin{tabular}{l}
Your name\\
Math 366, 13:30\\
Instructor: C.~Miller\\
\end{tabular}
```

Be generous with displays. It's true that journals like to minimize displays but you are not yet facing this. On the other hand, some expressions look cramped inline but ridiculous as displays. For ways around this, look up the usage of `\dfrac` and `\displaystyle`.

Include diagrams when appropriate. Just because you are using \TeX doesn't mean that you *shouldn't* include pictures or diagrams (*e.g.*, truth tables) to illuminate your arguments. Rule of thumb: If you would include a diagram if you weren't using \TeX , then include it even when you are using \TeX . This certainly doesn't mean that you have to produce fancy graphics to match your fancy \TeX . You may insert blank space and draw your diagram by hand, or even put your hand-drawn diagrams on a separate page (appropriately labelled).

Math operators. Whatever flavor of \TeX you use, producing “ $\sin x$ ” or even “ $\sin x$ ” when you mean “ $\sin x$ ” is unacceptable. And $\sinh(xy)$ is an abomination: does it mean $\sin h(xy)$ or $\sinh(xy)$? Use the math operator `\sin`. Similar remarks apply to `cos`, `arctan`, `max`, `min`, `sup`, `inf`, `exp`, `lim`, and other math operators. Lists of already-defined operator names appear in the above-mentioned \TeX documentation. You can, and should, define your own operator names as well whenever appropriate.

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