Writing Guide

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Part of your homework will be graded based on writing quality. Being able to write nicely in English will be very important if you undertake a research career, as well as in many other careers, and you must practice from Day 1 of your time as an undergraduate. (By the way, writing well will also help you think well.) Pay attention to these points:

- Write in complete sentences. Sentences start with an uppercase letter (‘A’, ‘B’, ...) and end with a period ‘.’.
- Always put a space after a period ‘.’ or after a comma ‘,’. Never put a space before a period or a comma. (Same for other punctuation marks such as ‘:’ or ‘;’.) This is a very simple and basic rule, but I have noticed that Chinese people have a hard time sticking to it! But really, making a mistake like this looks horrible to an English-speaker. (I’m not exaggerating.)
- A parenthesis can include a whole sentence, or be in the middle of a sentence. (This parenthesis consists of a whole sentence, for example.) Do never (I mean, never) put the period ‘.’ outside the closing parenthesis when a parenthesis consists of an entire sentence. What I mean is that this is wrong:

\[
(\text{The latter inequality can also be proved by an averaging argument}).
\]

This drives me nuts! The correct way is:

\[
(\text{The latter inequality can also be proved by an averaging argument}).
\]

The ‘T’ matches the ‘.’ and the ‘(‘ matches the ‘)’. These opening and closing symbols are nested—get it?
- Displayed math is part of the sentence, and is punctuated as if it were not displayed. For example, I can assert that

\[
2 + 2 = 4
\]

and continue my sentence below. Moreover

\[
a^2 + b^2 \geq 2ab
\]

since

\[
a^2 + b^2 - 2ab = (a - b)^2 \geq 0.
\]

Notice how I put a ‘.’ at the end of the last portion of displayed math? That’s because my sentence stops there. Another example: “It was 1883 when Cantor intuited that

\[
\mathbb{R},
\]

the beloved set of real numbers, had cardinality greater than \( \mathbb{N} \).” (Notice how I put a comma after \( \mathbb{R} \)? Because I would have put that comma if I had not displayed \( \mathbb{R} \) on its own line.)
- Use the \LaTeX\ commands \texttt{\left} and \texttt{\right} to get parentheses (…) and brackets {…} to be the right size; for example

\[
(1 + \frac{1}{n})^n
\]

is no good. We want

\[
\left(1 + \frac{1}{n}\right)^n
\]

as achieved by writing \texttt{\left(1+\frac{1}{n}\right)\right). (If the size looks a bit too large—which happens sometimes—you can also try using \texttt{\big(} or \texttt{\Big(} instead.)
• Style: simple things should be explained simply and succinctly; no use writing a novel if there’s a way to avoid it. Generally speaking you should aim for the kind of writing that you find pleasing to read. Keep in mind that the first time one explains something the explanation is often more complicated than necessary. Later, one finds a simpler way of explaining the same thing. Since a simple explanation is also easier to write down it is worth thinking before writing. Along the same lines, when you first solve a problem you will usually be in love with your solution; but think if there isn’t a simpler solution. Being in love with your ugly baby is no excuse! (In fact, one often discovers some interesting math while polishing a solution.)

• Be clear in your mind about when you want to start a new paragraph, and when you don’t. You can use the command `\noindent` to prevent \LaTeX{} from indenting a block of text. You can use the command `\vspace{}` to add or remove vertical space between paragraphs/equations in special situations. (As in, e.g., `\vspace{2.5ex}`).

• Math: Have high standards and be rigorous. Like I said above, it’s no use to be paranoid and to provide a million uninteresting details, but on the other hand you should provide enough detail so that there is absolutely no doubt that you know what you are doing. And by the way, do you know what you are doing? You must at the very least know whether your own argument is correct or not; if you are not able to judge, chances are you don’t know what you are doing and that your argument isn’t correct. Never submit something that you aren’t sure about while pretending otherwise. That’s basic intellectual honesty.

• “E.g.,” is always spelled like that (or possibly “e.g.”, if it’s in the middle of a sentence). It means “for example”. Similar spelling for “i.e.,” which means “that is” or “in other words”. Both “e.g.,” and “i.e.,” are preceded by a comma, if they come in the middle of a sentence: I like pie because, e.g., it tastes good.

• By default, \LaTeX{} creates a larger-than-average space after a period, because \LaTeX{} thinks the period is ending a sentence. But if the period doesn’t end a sentence and you want a normal space (as in J. P. Steinberger, say) then enclose the period in dollars (like this \$.) or follow it with a tilde (like this \~{}). The tilde acts as a space and will make the period “stick” to whatever comes after the space—meaning the period will stay on the same line as the thing that follows.

• A page range, as in “pp46–52”, is written with -- in \LaTeX{}. On other hand, the long dash—I mean this thing—is obtained by writing ---.

• Use `\label` to label displayed equations, and the command `\eqref` to refer to such labeled equations. As in, `\label{apple}` and `\eqref{apple}`.

• Don’t be discouraged if your English is poor. Good math writing is not the same as good English (and vice-versa). Practice makes perfect.

• Be polite. Use formal speech, do not use slang. Sometimes I’m informal when I write (like right now: “I’m” instead of “I am”) but that’s ok because I’m the teacher, you see? In your homework, you should practice the same level of formality as you would use in a published paper.

• Use `amsmath`’s `align` environment for multiline equations (please see http://tug.org/pracjourn/2006-4/madsen/madsen.pdf for more details). Also familiarize yourself with `\nonumber` and with `\begin{cases}`, `\end{cases}` (another helpful environment).

• Cite sources, give acknowledgements. You can never lose points for this. You will only gain respect!

• Use `\` and `\'` for opening and closing quotes in \LaTeX{}, as opposed to `. The difference is: “It’s easy!” (good!) vs. ”It’s easy!” (bad!).