Guidelines on Mathematical Style

Good mathematical writing is a subset of good writing. Almost all the rules set forth in a style manual such as Strunk and White's *The Elements of Style* or *The Chicago Manual of Style* apply equally well to mathematical writing. In particular, you must write in complete sentences, with correct grammar, spelling and punctuation.

- The use of symbols should be restricted to equations, variables, and other mathematical expressions. For example, do not use & or + to mean *and*, → to mean *implies*, or your favorite symbol for contradiction. As a more extended example, a sentence like

> Sps. $|V \cup X| = k \therefore C$ perfect matching s.t. $|C| > k$ so $2 + 2 = 5$ contradiction.

is unacceptable in formal writing. Replace it with something such as

> Suppose $|V \cup X| = k$. Then C is a perfect matching and $|C| > k$, so $2 + 2 = 5$, which is a contradiction.

- On the other hand, do not use words in place of a mathematical expression when the latter would be clearer and more concise. Avoid, for example,

> Choose any set A that contains at least one element of X, and let B be the remaining ones.

Quite apart from the bad grammar, the words "any" and "remaining" invite needless confusion. (Especially "any", which can mean either "some" or "each" depending on context, hence should be avoided.) Instead, combine mathematical precision with correct English by writing, for instance,

> Choose a set $A \subseteq X$ such that $A \neq \emptyset$, and let $B = X - A$.

- Keep your sentences short. Avoid long, rambling, unstructured sentences encompassing several different ideas, not to mention complex grammatical constructions, that quickly become complicated and rife with so many various different ideas that the reader is liable to forget what you were talking about in the earlier part of the sentence before all the confusion ensued.

- A closely related principle: *eliminate excess verbiage.* For example, the sentence

> So if we consider $J'|_G$ we have an acyclic subgraph which has $e(J'|_G) = n(H) - 1$.

contains a lot of unnecessary baggage. Compare instead

> The subgraph $J'|_G$ is acyclic, and $e(J'|_G) = n(H) - 1$.

- Be especially careful to avoid ambiguity with Boolean expressions and those that quantify: "and", "'or", "any", "some", etc. For instance, consider this fragment:

> If any vertex u is not adjacent to v or w, then...

This could mean any one of several different things, and it is not clear what the writer intended. Does "any" mean "all" or "a single one"? Does "not adjacent to v or w" mean "adjacent to neither v nor w" or "either not adjacent to v or not adjacent to w"? This kind of ambiguity can usually be avoided by thoughtful rephrasing and/or judicious use of notation. For example, both

> If there is some vertex u with $\{v, w\} \cap N(u) = \emptyset$, then...

and

> If v and w have no common neighbor, then...

are two possible resolutions of the offending sentence; these two have very different meanings, but neither can be misinterpreted.

- Don't introduce unnecessary notation. To continue the last example, the sentence

  If v and w have no common neighbor, then $d(v, w) \geq 2$.

is better than

  If for every vertex u we have $u \notin N(v) \cap N(w)$, then $d(v, w) \geq 2$,

not just because it is shorter and clearer, but even more importantly because it does not ask the reader to keep track of an unnecessary symbol (here u). A small gain, maybe, but these little things add up fast.

- Have mercy on your reader's eye by leaving blank space where appropriate—for instance, around important equations, or proclamations such as Theorems and Claims and Proofs.

- One of my pet peeves is the word "obviously". Nearly all the time, it can be struck out from any sentence in which it appears with no loss of clarity, but rather an improvement in tone. Alternately, a sentence claiming that some fact is obvious can be replaced with a sentence that actually explains that fact. If the reader agrees with you that some fact is obvious, then there is no need to say so. On the other hand, do not risk making your reader feel stupid for not grasping some point immediately upon reading it. Also do not use "obvious" as code for "something I could prove if I wanted to go into all the details, but I don't feel like taking the time or energy"—if that's what you mean, then say so. The same admonitions apply to "clearly", "trivially" and the like. In short, avoid "proof by intimidation": treat your reader with respect.

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