Checklist for writing mathematical papers in statistics and ML

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Some personal suggestions (via accumulated wisdom) for my own students (not broad advice):

• Name the main tex file intelligently. Everything should be in one file, except possibly macros.
• The abstract is supposed to be abstract and not detailed: summarize setup and main results succinctly. Avoid citations unless necessary. Avoid future tense in abstract and paper (we will provide → we provide).
• Divide related work into two parts: (a) those who have studied aspects of the same problem and those whose work your paper directly builds on or uses insights from, (b) other somewhat orthogonal but complementary papers. I prefer to include (a) in the introduction, and possibly (b) either in the discussion or in an “other related work” section at the end of the paper. Be concise and to the point, and give fair credit when it is due.
• Any text inside a figure (such as a legend) must have a font size that is readable, matching or almost matching but not exceeding the size of the other text. Any lines in a figure must have multiple complementary sources of identifiable information: for example, I use color, texture and symbols (red vs. blue, dashed vs. dotted, triangles vs. circles). Figures should have error bars; if negligible, explain why explicitly in the caption.
• Equations are often part of a sentence, so follow them with the appropriate punctuation (commas or fullstops).
• Theorem statements must be crisp and yet self-contained. Consider defining technical assumptions and necessary notation before the theorem and discussing them (what they mean and why they are needed). Even so, refer to all assumptions (by number or phrase) in the theorem statement so that it is self-contained.
• Leave the word “theorem” for a handful of powerful central results. Some may be propositions (interesting results of possibly independent interest) or lemmas (a technical result within a longer proof that can be packaged) or just facts (well known theorems from classical papers) or corollaries (interesting implications of theorems) or remarks. Number each type separately.
• Interpret any theorem, proposition, corollary or lemma for the reader (to provide intuition), and provide a forward link to its proof if needed. Organize proofs modularly, give proof outlines, don’t end them abruptly.
• Number equations that a reviewer or reader may want to refer to. Don’t number every equation in a proof.
• Don’t say “This implies...”, say “Inequality (3) implies...”. Avoid superlatives. Avoid ∀ (say for all). Avoid starting a sentence with “so”. Avoid phrases like “we get” (say we derive/conclude/infer/...).
• Distinguish between a function \(f\) and a value \(f(x)\). A function \(f\) can be monotone, but \(f(x)\) cannot.
• Use macros for all symbols, in case they need to be changed. Name macros or labels so that you recognize them a year later. Use a ~ for references; for all equations/sections/figures: write Section~\ref{SecPower}. Familiarize yourself with latex commands like bmatrix, align, cases, subequations, mbox, hspace, vspace, etc.
• Make sure sections flow: don’t end or start them abruptly. The last line of a section should serve as a natural connector to the next section. Don’t have sections with just one subsection. If you have one important point in a section, don’t make a subsection, if you have two important and separate points, have two subsections.
• Check references for capitalization, authors, etc. Often Google Scholar bib entries must be edited/updated.
• Make sure Appendix is organized well, every section should be referenced appropriately in the main paper.
• Perform automated spelling and grammar check (eg: Copy text into Google Docs or Microsoft Word).

When you sign off on a paper, you should be proud of it, and ready to defend its details. Integrity is paramount.