Final Project Advice

Final Project Due: Friday December 19

If you are writing an expository paper for your final project, here are some guidelines and requirements.

The paper must be typeset. My recommendation is to use some form of TEX, for example, LATEX is pretty standard and the department machines are loaded with the program TexShop for using it.

It need not be long. Ten pages is sufficient, over twenty is probably too long. Yes, Spelling and grammar count.

Know your audience. If you are writing an expository 631 paper, it should be pitched at your fellow Math 631 students. What should they be expected to know? What things should be recalled? Actually, I personally find it helpful to write papers (and give lectures) to some specific people I talk regularly with. How would you explain this to the specific student you've been working with on the problem sets?

The best general advice I can give: **Have mercy on your readers!**

Some important Ingredients.

1. Introduction. Most people only read the introduction of most papers they pick up. It should be clear and not overly technical. It is crucial that it puts your topic in context and explains the "big picture". For example, why is it important or interesting? Where did it first arise or who looked at it? Hopefully, it gets your reader interested. Precise definitions can wait until later, especially if it takes some effort to state them.

2. Technical Definitions and Theorems. These should be clearly and carefully stated, isolated out from the text, for example using a TEX environment for that purpose. When actually stating a theorem, usually all hypothesis should be repeated, even if you'd been assuming some of them throughout the prior discussion. Many readers are scanning papers and just read the theorems.

3. Examples. Crucial! Choose good ones, some very simple to get the definitions across, some more involved. Actually for many of you, a substantial example may be the heart of the paper.

4. References. Absolutely essential to any research or expository paper. These can include your sources, as well as places the reader can learn more, and even tangentially related papers.

The Writing Process.

I see three steps. I always follow these myself.[1]

1. An outline: This will help you organize the material. Spend some time on it! I usually hand-write mine.
2. A draft: Be sure to ask your friends to read this and make suggestions. Ideally people with different mathematical backgrounds/perspectives. At least make sure someone reads the introduction and skims the body! If you are a non-native speaker, make sure a native speaker checks your syntax.
3. The final paper.

There are lots of sources out there for mathematicians with advice how to write. I hope you will look at some of these now, especially the first three classics, and later throughout your career.

1. Steven G. Krantz, *A Primer of Mathematical Writing: Being a Disquisition on Having Your Ideas Recorded, Typeset, Published, Read and Appreciated*, American Mathematical Society, Providence RI.
2. Norman E. Steenrod, Steenrod, Paul R. Halmos, Menahem M. Schiffer, Jean Dieudonne *How to Write Mathematics.* American Math Society. Providence RI.
3. Donald E. Knuth, Tracy L. Larrabee, and Paul M. Roberts, *Mathematical Writing,* Mathematical Association of America, Washington, D.C. (1989)
4. If you type "Mathematical Writing" into google, you'll pull up numerous websites where professors have posted advice about writing math papers for their students. A lot of it was good. You might want to take a look.

Finally, remember that rules are made to be broken, and much of the advice you'll get about writing math papers (and about life) will directly contradict other advice you've heard. There are good writers who flaunt the standard advice and bad writers who follow it carefully. Develop and defend your own style!

[1] also for talks, with the third step being the lecture—even (usually) Math 631 lectures