

Presentation:

- You must use PowerPoint or a similar program.
- You don't have to cover your entire paper in this talk. In fact, you won't be able to. The paper will give all the details like proofs of theorems, etc, that you can't cover in your talk. Think of your talk as an overview of your topic with some of the details. You want to try to make it accessible to the other students who haven't studied your topic.
- Some ways to organize your talk / include in your talk:
 - What is the topic that you chose?
 - A brief history of the topic
 - The main theorems and maybe a short proof
 - Examples
 - Applications
 - Open problems that haven't been solved yet
- Suggestion: Don't put too much information on each slide. Make the slides simple.

How I will grade your presentation: I will be grading your presentation using the following rubric.

- Correctness/preparedness/understanding: Are you using correct mathematical notation and terminology? In proofs, does each step follow from the previous step? Are you prepared and do you understand the topic?
- Communication: Are you clear in what you say/write? Are you well organized? Are your slides organized? Can we hear you?

Paper:

Requirements: The paper must be at least 10 pages long (single spaced), not including the title page and bibliography/references. It must include a title page and a bibliography / references section. You may use Word or LaTeX or any other word processing software.

Some notes on writing your paper: Here are some of the topics that I will use to grade your paper: clarity, mathematical rigor/completeness, organization, grammar/spelling, depth of study, and mathematical content.

- **Mathematical Content:** This is a mathematics paper, so there should be proofs. **In fact, there must be at least a few proofs in your paper to get full credit.** Don't shy away from the theory of your topic. You don't have to prove everything, but pick some good proofs to put in there. There should also be examples and/or applications. Select a few good examples/applications that really illustrate the theory.

- **Organization:** Your paper should be well organized. It should be broken up into sections. Your paper must have an introductory section and a bibliography section. The title of your paper and your name should be first. Look at some textbooks and mathematical journal articles and notice how the author organizes the material. You should organize your paper with headers, such as the following: example, definition, theorem, proposition, lemma, remark, and note.

It's a paper, so everything should be in sentence form. Don't put formulas in the middle of the paper that aren't part of a sentence. Formulas should be part of a sentence. Your paper should have things like:

"This implies that $\langle \text{formula} \rangle$ "

"Formula 1 implies that $\langle \text{formula} \rangle$, which further implies $\langle \text{formula} \rangle$ "

"This gives us the following formula:

$\langle \text{formula} \rangle$

- **Sections:** Your paper should be divided into sections. Every paper will be organized a little differently---it depends on the topics and what you want to say about it. Below are some standard sections and subsections you may want to include.
 - *Introduction / Background:* Give an overview of the subject. What's interesting about this topic? What's the history of the subject? What are some other main results in this area of study? This could be a stand-alone section, or a subsection of an introduction, or ...
 - *Preliminaries:* State basic definitions and other theorems (with either proofs or citations) you'll need in order to discuss your main theorems. This could be a stand-alone section, or a subsection of an introduction, or combined with a main theorem section, or ...
 - *Main theorem(s):* State and prove the main theorems. This could be one section or you could have different sections for each area of the topic.
 - *Examples:* Give examples illustrating the theory. This could be one section or you could have different sections for each area of the topic.
 - *Applications:* Discuss ways in which the main results are used, either in mathematics or in the real world. This could be a stand-alone section, or a subsection of another section, or ...
 - *Open problems:* State and discuss problems related to your main subject that are currently unsolved. This could be a stand-alone section, or a subsection of another section, or ...
 - Math papers almost never have a conclusion.
 - *Bibliography / References:* At the end of the paper give a list of the references that you used.

- **Do not copy your sources word for word. You will not receive credit for this.** Write the proofs and examples in your own words. One way to do this is to read a proof/example, and then later on try to write it out without looking at your source.
- You don't need to go over every detail of every computation or every proof relating to your topic. Choose a few key illustrative items to go in depth with, go through the details of those, and then skip over the details of other topics.
- You are not expected to do original mathematics. Instead, write about something others have done.
- I'll ask myself the following questions when grading your paper:
 - Is it clear?
 - Is it well-organized?
 - Is it written using mathematically correct notation and terminology?
 - Is there either a proof or a citation (reference) for every theorem?
 - In proofs, does each step follow from the previous steps?
 - Does it convey a sense of why the topic is interesting, useful, or important?
 - Does it both give details but also a bird's-eye view? For example, when stating a theorem, it is a good habit to both state it precisely but also give an intuitive sense of what it means.