**The Lab of Geometry at Michigan**

Project report assignment overview

This document will be available on gitlab in the fa20-materials repository (this will be up by next weekend).

The project report is an individual write-up summarizing the project outcomes for a broad audience. There are two **audience choices** that students can make. The audience choices are **public audience** or **mathematical audience** which will be elaborated on below.

In both cases, you are encouraged to be creative in your format, within the parameters of the assignment (see rubric). You are encouraged to include lingering questions, or ideas for ongoing exploration. There should not be a significant amount of proof, though some proof can certainly be included.

## 1. Public audience project report

Writing a public audience project report is a unique challenge with many opportunities to be creative. The format of the project report can be very flexible - imagine a blog post, a think-piece article, a narrative piece of reporting, or the story of the history of the problem on which you are working. The idea is to write something which would engage a mathematically curious non-expert to want to learn more about your topic. A good trick is to think about how you would get a parent, sibling, or grand parent excited about your work.

A public audience report can include some proofs or justification, but should not be technical and must assume very little mathematical background.

The target audience is assumed to have an undergraduate degree and be intellectually curious, but may not have taken calculus. Imagine a consumer of Vox or New York Times.

Keep in mind that although there is much freedom of expression here, you will be evaluated on your ability to convey what *your team has accomplished this semester* and what methods you used to acheive these goals. So, for example, a piece that exclusively discusses the history, and completely avoids any mathematical content, would not receive a strong grade.

### 1.1. **Examples.**

- The Great Internet Math Off from Aperiodical which has a mix of written, video, and audio pieces:

  `https://aperiodical.com/category/the-big-internet-math-off/`
- Strogatz opinion pieces for the New York Times:

  `https://opinionator.blogs.nytimes.com/category/steven-strogatz`
- Evelyn Lamb for the scientific american, e.g.

  `https://blogs.scientificamerican.com/roots-of-unity/the-numbers-behind-a-fields-medalists-math/`

## 2. Mathematical audience project report

A project report for a mathematical audience can resemble a research statement, a mathematical blog post, a grant proposal, or other similar format. The audience can be assumed to have mathematical foundations in the core areas of mathematics - linear algebra, abstract algebra, real analysis, point-set topology, etc.

This report is not a journal article and should not follow such a format or style. There are more rigid expectations for format in this case, which are consistent with modern community standards for publications in math.

One can, but is not required to, include rigorous proof but this should not consume a significant portion of the work. Any proofs should be carefully chosen, and ideas attributed responsibly - for instance, if you include the proof or ideas due to another mathematician, you must make this clear. The work need not be self-contained but any 'black boxes' need to be made clear to the reader. Proofs must be accessible to a broad mathematical audience.

### 2.1. **Examples and resources.**

- Vaughn Climenhaga's math blog, e.g.

  `https://vaughnclimenhaga.wordpress.com/2017/06/07/alpha-beta-shifts/`

- Dan Margulit's Do's and Don'ts for Research Statements:

  `http://people.math.gatech.edu/~dmargalit7/tsr/dosdontsresearchstatements.pdf`

  (caveat, you must disregard the advice he gives to not use references. you should include both the name of the mathematician and the specific reference for this assignment)
- Tery Tao on writing mathematics, including many links to other resources:

  `https://terrytao.wordpress.com/advice-on-writing-papers/`

### 2.2. **Structure of a mathematical audience project report.**

Mathematical audience project reports must include the following content:

- **Introductory content** is fairly brief, is not technical, and includes framing or motivation for the results.
- **Preliminary content** covers any technical terms or conventions.
- **Background** contextualizes the results within the existing body of literature.
- **Summary of outcomes** must be clear and accurate
- **References**

For project reports *directed at a mathematical audience*, the Introductory, Preliminary, and Background content must appear under the section headers Introduction, Preliminaries, and Background, respectively, to receive full credit.

## 3. Evaluation and academic goals of the assessment

3.1. **Goals.** The primary academic goal for this assessment is to convey to your mentors and primary instructor your understanding of your project, its outcomes, and its relevance to the existing body of mathematical work.

3.2. **Grading.** The rubric lists the specific expectations I have and will use to grade the assignment. It will be sent out before next week. The rubric is to give more boundaries for this assignment and hold you accountable for these boundaries.

The rubric is not evaluating quality and clarity directly. Know that although lack of clarity in particular is likely to lower scores on other measures, it is not directly being evaluated.

Ultimately, the higher quality this document is, the stronger case you make for yourself professionally, beyond your time here at Michigan. This document can be used in resumes, on a professional webage or LinkedIn profile, and as a starting point for your future research statements. Perhaps most crucially, this document can be extremely valuable for letters of recommendation.

You should choose either a public audience or mathematical audience depending on which format most suits your professional goals.

## 4. Draft 1 assignment

4.1. **Goals.** This assignment is graded for completion only.

The goal of the assignment is to promote healthy time management, since many deadlines clump together at the end of the semester, and give you the opportunity to receive feedback on important components of your draft.

You have some intellectual freedom here to decide what feedback would be most valuable to you and write the draft accordingly. For instance, you may wish to block off portions of the document with a comment on what you plan to cover but have to save for later.

That said, for a full completion grade you must minimally address the following parameters.

4.2. **Parameters of the assignment.** Using the .tex template provided on gitlab (will be there by Thursday), write a *maximum of three pages* of the draft of your project report as follows:

(1) Public audience
   (a) Open with one sentence giving a motivating move (see the slides on presenting math) for your project. This is not part of your paper but rather is to help me effectively provide feedback on your draft. **Please clearly mark your motivating move.**
   (b) Write the pitch and introduction of your topic. Focus on writing something motivating and engaging, and developing the concepts in a non-technical way.

(c) Do not focus on explaining the results, unless time and space allows. You must complete the above for full completion credit.
(d) You must compile a bibliography with bibtex. There is no minimum or maximum citation requirement for the draft or final.

(2) Mathematical audience
(a) Open with one sentence giving a motivating move (see the slides on presenting math) for your project. This is not part of your paper but rather is to help me effectively provide feedback on your draft. **Please clearly mark your motivating move.**
(b) Do NOT write the introduction section.
(c) Write the preliminaries first. This is where you will gather technical terms and definitions that you need.
(d) Write either the background or summary of outcomes, or write some of both, whichever is most valuable to you.
(e) You must compile a bibliography with bibtex. There is no minimum or maximum citation requirement for the draft or final.

The instructions above must be following for full completion credit.

4.3. **Advice.** Many of the explicit advice from our presentations workshop apply to writing a document to a general or mathematical audience. As a reminder, these resources are available here:

`https://docs.google.com/presentation/d/1uhQbp_h7wGD7qBYT14-eJeqT0xA81RuwjwejpOD0hZU edit?usp=sharing`

For instance, choose carefully which definitions to include, and spend T.I.M.E. on these definitions. Include transitions which connect concepts laterally, and connect to the big picture goals or concepts. Use Black Boxes.