Math 480 Final Project

Overview: The project will consist of a 5–10 page paper and a 15-minute in-class presentation.

Content: You will apply mathematical techniques to answer a real-world question. (We can be flexible about the definition of "real-world.") You can apply the linear algebra techniques we will cover in class, or you can use other techniques. (For example, you could apply abstract algebra to understand quantum physics, or principal component analysis to analyze a data set, or complex analysis to analyze a vector field, or ....) It can be original research, or an explanation of more advanced applications. I'm very happy to talk with you about possible topics.

Your report should include the following.

(1) *Statement of the question.* What problems did you set out to investigate? What were the key issues?
(2) *Background.* Is there anything we need to know before thinking about your project?
(3) *Method of analysis.* How did you analyze the problem and derive your conclusions?
(4) *Results and conclusions.* What did you find out? Did you answer your questions? Construct graphics, if appropriate, to make the results clear.
(5) *Discussion and critique.* How sure are you of your results? How sure should we be? If there are alternative explanations or grounds for doubt, describe them fairly.

Paper: It should be 5–10 pages typed, including figures and tables. For many of you the write-up will include more information than you will be able to present (those 15 minutes will fly by!). The paper should be written in complete sentences, with correct grammar and punctuation. It should read like a research paper, not like a homework assignment. Lastly, it is very important to cite any outside sources and to include a bibliography. If you use existing datasets, be sure to cite them. Be aware of Agnes Scott's strict policy on plagiarism!

Your paper will be graded on the following criteria:

(1) *Content:* Do you address all of the issues in the assignment?
(2) *Can the paper stand on its own?* Can the paper be understood by someone who didn't see the presentation?
(3) *Style:* Is the paper well written (including punctuation and grammar)?
(4) *Citations:* Are all outside sources cited appropriately? Is there a bibliography?
(5) *Graphics:* Are your tables and figures clearly labeled? Are they easily understandable? Do they add to the paper?

Presentation: Each presentation should last 15 minutes. Your presentation can be as high- or low-tech as you'd like. Feel free to use the chalkboard, the computer projector, the document camera, the internet, Powerpoint, physical demonstrations, etc. You have a lot of freedom. Be sure to practice before you give your talk; you may find it more difficult than you expect, especially the timing.

Your presentation will be graded on the following criteria:

(1) *Overview:* Do you make clear at the beginning what questions you're addressing and how you'll address them?
(2) *Content:* Do you address all the issues in the assignment?
(3) *Clarity:* Is all new terminology and notation defined? Are your tables and graphs clear? Do you have a good balance between oral and visual information?
(4) *Style and organization:* Is the talk polished? Does it look like you have practiced it? Is the talk well organized and well planned?

Hint: One of the most common mistakes that students make in presentations is rushing through the introduction. Make sure to spend plenty of time setting up the problem. Remember, the audience won't care about the answers you're giving if they don't understand the questions.

Proposal: Your proposal should include:

- The question(s) that you're trying to answer (include any necessary background information).
- The mathematical techniques you'll use to answer them.
- What sources you'll use.
- What data you'll use, if any – where you'll find them or how you'll collect them.