Project Overview

Purpose

For this project you will choose a topic to investigate using the mathematics from our course. You will research the topic, providing background information, and then demonstrate how you used mathematics to further analyze or understand that topic.

The purpose of this project is twofold.

- First, it is an opportunity for more authentic and sustained experience with the second theme of the course: the What, How, and Who (WHW) of mathematics.
- Second, as a teacher you will often need to develop your own mathematical problems/lessons/projects. While this course does not focus on the specifics of good teaching per se (e.g., what kinds of problems to give to your students and when and why to do so), this is a chance to analyze a topic mathematically and think about how you could make connections between a topic and the mathematical concepts you are expected to teach.

Topics

Below are a number of ideas for possible topics you might investigate, but you are also free to come up with your own topic (I recommend you discuss it with me as soon as possible). The topic should deal with a social/political issue or culture and mathematics.

- Social/Community/Political: immigration; racial profiling; poverty; media bias; community resources (or lack thereof) such as parks, recreation centers, etc.; affordable housing; population growth; child labor; election systems (e.g., different voting systems, gerrymandering, voting power per person, campaign finance); drug laws and related incarceration rates; criminal justice system (e.g., disparities in sentencing, comparisons to other countries, costs)
- Education: testing, access to qualified teachers, access to AP coursework, resources, play space at the school, funding (e.g., disparities within the U.S., comparisons to other countries), achievement/opportunity gaps, bias in curricular materials (e.g., books, posters), private/corporate spending in education
- Economic: global poverty, poverty in the U.S., minimum/living wage, income/wealth distribution in the U.S. and/or world, taxes, public transportation costs, loans, housing, government spending/priorities, sweat shops (e.g., money earned by workers vs. profit to company), bank accounts, credit cards, disparities in pay, corporate tax rates, financial understanding, unemployment
- Health and Environmental: access to health insurance, access to healthy food or school lunches, mortality rates (e.g., around the world, by race/ethnicity, by SES), water quality, air quality, pollution, destruction of habitats, hazardous waste sites, trash and recycling, environmental racism
- Cultural: mathematical practices and contributions of a specific cultural group (e.g., numeration systems, games, puzzles), historical groups (e.g., ancient Egyptians) or current groups (e.g., algorithms used in other countries)

Expectations
You will produce a "paper" that documents your research into this topic. I am open to a variety of formats including multimedia, power points, prezis etc. However, it must be something that I can open on my computer (or read a hard copy of) on my own and understand everything you want to communicate. These will not be presented in class, so the final product must stand on its own.

Your paper should address the following two sections.

Background Information
Assume that I do not know much about the topic you are investigating and provide some relevant background information. This should include enough properly cited sources to cover the important ideas associated with your topic. You should seek out high quality sources whenever possible such as reputable newspapers, government reports, and/or materials I suggest.
Note: Wikipedia is a great place to find sources for this project (and get the big picture), but it is not an appropriate reference on this project.

Use of Course Mathematics
You must draw on the mathematics from this semester during your project. You can make connections to other topics such as geometry, measurement, probability, and statistics (which will be addressed in 302B), but there must be substantive connections to one or more topics from this semester.

There are two main ways you can make use of the course mathematics (you can combine them), but if you think of others I am open to discussing it:

- Write mathematics problems that are substantively connected to your topic, meaning the problems you write are valuable for gaining greater insight into your topic. In other words, you should not just write a bunch of problems that only superficially connect to your topic.
  If you do this you should:
  - Solve some or all of the problems (depending on what you produce).
  - Explain your solutions and what mathematical concepts from the semester they draw on or are connected to.
- Demonstrate how you personally used mathematics to learn more about this topic. This would involve explaining any mathematical work you did and what mathematical concepts from the semester your work draws on or is connected to.

Timeline/Assignments

Parts 1 and 2 of the project are worth 5 points each (the same as a reflection assignment), so you should take these seriously. Moreover, the better your work is at the beginning the better feedback I can provide to result in a stronger final product. The final project is worth 20 points (or the equivalent of 4 reflection assignments). This project and the reflections are together worth 20 percent of your grade.

Project Assignment 1: Due 3/19

- A list of no more than three possible topics you might investigate for your project.
- Each topic should have a brief description about it and a description of how you will use mathematics to understand it in greater depth.
- Provide at least one reference per topic.
- Turn this in to the relevant folder in the d2l Dropbox.

Project Assignment 2: Due 4/09

- A detailed outline of the major themes of your project and what mathematics you are using to understand them.
- Include references to at least three sources.
- The more detailed the outline the better feedback I can give.
- Turn this in to the relevant folder in the d2l Dropbox.

Project Assignment 3: Due 5/02

- A final draft of your project.

Grading

A* 100%	Goes above and beyond a grade of A by doing one or more of the following: • Showing particular depth of thought, understanding, and research into your topic. • Particular depth into the mathematical content, possibly by extending the mathematics in a meaningful way beyond what we covered in class.
A 95%	Thorough and thoughtful analysis of the topic selected. This involves most or all of the following: • Thoroughly completing all previous assignments • Incorporating my feedback on earlier assignments into your final product • Thorough research into your topic and a clear synthesis of this information in your background information • Substantive use of important mathematical concepts from our course (meaning you showed deep use of the mathematical concepts) • Use of mathematics in a way that adds greater depth or clarity to your topic (as opposed to a superficial connection between the mathematical concepts and your topic)
B 85%	Good research into your topic and connections to course content, involving: • Similar to an "A" but lacking minimally in one or two bullets
C 75%	Basic research into your topic and connections to course content, involving: • Similar to an "A" but lacking more substantively and/or in multiple bullets • Minor mathematical or factual errors
D 65%	Minimal work or connection to course content, involving several of the following: • Not completing all of the earlier assignments on time or in depth • Failure to incorporate my feedback from earlier assignments • Minimal references and/or background information • Minimal or superficial use of class mathematics • Only superficial connections between the mathematics and your topic • Mathematical errors or factual errors in background research
E 0%	Serious problems with your work involving: • Most or all of the bullets listed under a "D"