FINAL PROJECT IDEAS

1. Final project description

The final project consists of a **poster** and a **short presentation**. During the four classes in December we will have poster sessions, where people will stand by their posters and describe their projects while people walk around and ask questions.

If you choose a **person**, your project should cover some of their biographical details, as well as a description of some of their mathematics. You can describe their mathematical ideas from the perspective of either their importance to mathematics or their importance to applications outside of mathematics. If you choose an **idea** you should give a history of the idea as well its importance, either within mathematics or in the general world.

2. Topics: People

This is by no means an exclusive list of important mathematicians; rather, it is a jumping-off point. I have limited myself to a list of 20 to begin, as I strongly encourage you to find people you find interesting or inspiring.

- Shiing-Shen Chern
- Elbert Frank Cox
- René Descartes
- Leonhard Euler
- Évariste Galois
- Carl Friedrich Gauss
- Sophie Germain
- Kurt Gödel
- Alexander Grothendieck
- David Hilbert
- Grace Murray Hopper
- Katherine Johnson
- Muhammad ibn Musa al-Khwarizmi
- Ada Lovelace
- Maryam Mirzakhani
- John Nash
- Emmy Noether
- Srinivasa Ramanujan
- Terry Tao
- Andrew Wiles

3. Topics: Mathematical ideas

There are many mathematical ideas that have influenced progress both inside and outside of mathematics. As in the previous section, this is not an exclusive list, and I encourage you to try and seek out your own topics. Unlike the previous list, where alphabetical order was a good default choice, this list is given in no particular order.

- Topology and the Euler characteristic
- Cryptography and the RSA algorithm
- Mathematics of folding and origami
- P vs NP
- Graph theory (Eulerian and Hamiltonian paths and graph coloring)

- The law of large numbers and regression to the mean
- Gödel's incompleteness theorem
- The parallel postulate and non-Euclidean geometry
- Fermat's Last Theorem
- The four-color problem
- The Banach–Tarski paradox
- Quadratic reciprocity
- Transcendental numbers, e and π
- Buffon's Needle, Buffon's Noodle
- Constructions with a compass and straightedge
- Scissors congruence and the Dehn invariant
- Countability vs. Uncountability
- The Ballot Problem
- The mathematics of voting systems
- Turing machines