

MATH 340A: Final Project

For your final project, you will be learning about a topic outside of the material presented in lecture, and presenting your findings. You may work in groups of up to 3 people. Your options are:

- A 15-20 minute presentation during the last week of class (August 14th to August 18th).
- A 5-10 page expository writeup of your topic.

I will send out an email soon for you to let me know what topic you would like to work on, as well as your format and any other students you would like to work with.

You will be graded holistically on your project, with an emphasis on the correctness of the mathematical content, your understanding of the material, and the presentation of the material in a manner which is appropriate for your audience. Keep in mind that your intended audience should be your classmates - they should be able to listen to your presentation or read your paper and understand what is going on.

I have included a list of topics below, both in theoretical and applied directions. These are merely suggestions - feel free to come up with your own topic! Before declaring your topic, please run it by me so I can make sure that it is appropriate, and also that no one else has already claimed your topic.

- Infinite Dimensional Vector Spaces (Hilbert Spaces, Functional Analysis, etc).
- Tensor Products.
- Linear Algebra over Rings (Module Theory).
- Representation Theory.
- Canonical Forms (Rational Canonical Form, Smith Normal Form, Singular Value Decomposition).
- Lie Algebras.
- Graph Theory and Markov Chains.
- Algorithms for Linear Algebra.
- Game Theory.
- Applications of Linear Algebra to Physics/Quantum Mechanics.

Please let me know if you have any questions!