Math 102 Final Projects

For your final projects, you will have a set of 5 different projects to choose from (see list below). You will work with a partner and write a paper in which you describe the mathematics of your project.

The goals for this project are for you to:

1. Practice learning new mathematics independently
2. Deepen your knowledge.

I am estimating the length of your paper to be between 3 and 8 pages. Your write up should be long enough for you to describe the solution of the problem you are studying in your project. I will be supplying you with a project rubric.

The time table for the project is as follows:

- Wed April 8th. Submit one paragraph stating which project(s) you are interested in working on and who your partner might be. For people who do not have a partner figured out by this point, Prof. Donnay will help link people up.
- Monday April 13th: final decisions made as to partner and topic.
- If you hand in a rough draft of your paper by 4pm on Monday April 27th, Prof Donnay will read it and give you feedback.
- After 5 pm on Wednesday April 29th, Prof. Donnay will no longer answers any questions about the project.
- Hand in your finished product at the start of class on Friday May 1.

Project Choices

1. Carbon Dioxide in Pond Water. Use calculus to study the absorption and release of \( CO_2 \) by plants and animals in a pond during the course of a day. This issue is a piece of the global warming puzzle. If we transfer this problem to a larger scale, we could try to calculate how much \( CO_2 \) is absorbed and released by the world’s oceans.

2. How Fast Does a Tank Drain? Use mathematical modeling and differential equations to predict the flow rates out of a canister. This information can be used to help design a sprinkler system for hotels in less developed countries.

3. Water Purification: Help a community design a more efficient water purification plant by determining the appropriate size for a Flow Equilization Basin and then finding the proportions that will minimize the cost of constructing this basin. You are asked to carry out Requirement 1 and 2 of Situation 1.

5. Fractals. Use infinite series to study fractal shapes: The Cantor Set, the Sierpinski Carpet, and the Koch Snowflake curve.

Each of these projects is described in more detail in the project links.