MATH 223—Project Instructions

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Project Goals: The final project is intended to give you an opportunity to start building some experience working in groups on math-related topics. You will work in groups of five (5) to convince me (and yourselves) that the tools we gain in Multivariate Calculus can be used elsewhere. You will write a short paper introducing me to your topic through a calculus perspective, and you will present a simplified version to the class focused on pointing out the relationship between calculus and your topic of interest. There will be extra credit up for grabs for groups that submit work of exceptional quality.

Roles:

Group Leader You are responsible for all submissions and deadlines. You will organize group meetings outside of class. You will also be responsible for editing and submitting the final version of your group's paper.

2× Researcher You are responsible for the written portion of the project. This includes researching your topic and actually writing.

Coder You are responsible for generating any images or figures to illustrate the material. You should be ready to answer any questions about your figures during the presentation.

Presenter You are responsible for presenting your work to the rest of the class, and for answering any questions.

If your group has four (4) members, one member should take on both the Coder and Presenter roles.

Written Requirements:

- Two (2) pages of single-spaced typed text, not including figures, pictures, graphs. The maximum page count is four (4): I will stop reading after the fourth page. If you have lengthy calculations or proofs, you can submit in an Appendix at the end and I will not count them as part of the page limit.
- At least three (3) figures made using Mathematica. These figures should be directly related to the material and useful for illustation. Make sure the figures are clear and easy to read.
- In addition, each of you will individually submit a short reflection answering the following prompts
  - Give a description of your contribution to your group.
  - What if anything surprised you about your topic?
  - What would you personally do differently the next time you have a group project?
  - Do you have any constructive feedback for your groupmates?

Presentation Requirements:

- The presentation will last a maximum of ten (10) minutes, followed by five (5) minutes reserved for questions from me and your classmates.
- The presenter of your group must present. They may split the presentation with one other member, if your group chooses.
- The talk should be clear and easy to follow.
- The more detailed parts of your project should be left out of the presentation since they will feature in your paper. Be ready to answer questions about those details, though.

- Any format of talk is acceptable: a talk with handouts, a digital presentation, whiteboard only, etc. If you want to do something more outlandish like an interpretive dance, you must get my approval first.

Recommendations:

- Set group milestones to avoid leaving all the work until the end of the semester.
- Meet regularly.
- You are all responsible for the success your project. You should help each other whatever your role is. However, at the end of the day, your primary responsibility is to your role.
- Ask me for help when you need it.
- The feedback portion of your individual reflection is not an invitation to lash out at each other; this is a chance for you to offer genuinely helpful advice that I will incorporate into my feedback. You will have many opportunities to come speak to me about any concerns or complaints you may have during the semester.

Maths Topics to Think About:

- Vectors, dot products, cross products.
- Vector-valued functions.
- Vector fields, flow.
- Level curves/surfaces, gradients.
- Area, volume, double and triple integrals.
- Coordinate changes.
- Path integrals.