

Math 118 Calculus Projects

Fall 2005

During the last full week of classes, you and a partner will turn in a calculus project. The project consists of a paper and an in-class presentation. The paper is due at the beginning of class on Friday, 12/9; the exact time of your presentation will be determined later.

To complete your project you can use any resources you want. Depending on your project you may want to consult textbooks, books from the library, journal articles, the internet, etc. You are required to use at least two sources in addition to the handout that you are given. (Websites and your textbook don't count toward this minimum.) Here are some concrete suggestions.

- The best place to find journal articles about mathematics is MathSciNet. You can access it from <http://library.agnesscott.edu/> by clicking on A-Z Database List, then MathSciNet, or use the direct address: <http://0-www.ams.org.sophia.agnesscott.edu/mathscinet> .
- There are many excellent java applets on the web. See if you can find one that illustrates your example.

Due by **3:00, Tuesday, November 15** : send me an email with the following information.

- (1) The names of the two people in your group.
- (2) A list of the top 5 projects that you'd like to present. List them in order with your favorite first and your least favorite last.

The presentation: Each presentation should last between 10 and 15 minutes. Both group members are responsible for presenting. Your presentation can be as high- or low-tech as you'd like. Feel free to use the chalkboard, the overhead projector, the internet, Powerpoint, physical demonstrations, etc. You have a lot of freedom. Be sure to practice before you give your talk; you may find it more difficult than you expect!

Your presentation will be graded on the following criteria:

- (1) *Overview:* What is the context of the problem? Was the background of the topic explained? What assumptions are you making?
- (2) *Mathematics:* How is calculus used in your project? Have you clearly explained how the methods of this course help answer the question? Since you only have 15 minutes you do not have time to do every detail, but you should at least outline the development of the necessary mathematical theory.
- (3) *Clarity:* Is all new terminology and notation defined?
- (4) *Style and organization:* Is the talk polished? Does it look like you have practiced it? Is the talk well organized and well planned? Did both members participate in the presentation?

Hint #1: It's a very, very, very good idea to visit the Speaking Center while you're planning your presentation.

Hint #2: One of the most common mistakes that students make in presentations is rushing through the introduction. Make sure to spend plenty of

time setting up the problem. Remember, the audience won't care about the answers you're giving if they don't understand the questions.

The paper: There is no page limit (maximum or minimum) for your write-up. It should be typed. For many of you the write-up will include more information than you will be able to present (those 15 minutes will fly by!). The paper should be written in complete sentences, with correct grammar and punctuation. It should read like a research paper, not like a homework assignment. Although I will list tasks for you (a, b, c, etc.) you shouldn't write your papers in that way. You are free to use any word processing software that you like, but Microsoft Word has an equation editor that may help with the writing. Lastly, it is very important to cite any outside sources and to include a bibliography. Be aware of Agnes Scott's strict policy on plagiarism!

Your paper will be graded on the following criteria:

- (1) Do you address all of the issues in the assignment?
- (2) Can the paper stand on its own? That is, can the paper be understood by someone who didn't see the presentation?
- (3) Is the paper well written (including punctuation and grammar)?
- (4) Did you use at least two outside sources? (Remember, your textbook and websites don't count toward this minimum.) Are all outside sources cited appropriately? Is there a bibliography?

Timeline:

- (1) Tuesday, November 15 - submit project requests by 3:00
- (2) Monday, December 5 through Friday, December 9 - project presentations in class
- (3) Friday, December 9 - papers due at beginning of class

List of possible projects

- (1) (History) Biographical sketch of Newton's life and Newton's contribution to calculus
- (2) (History) Biographical sketch of Leibniz's life and Leibniz's contribution to calculus
- (3) (History) Newton and Leibniz calculus controversy
- (4) (History, physics) Where do functions come from?
- (5) (History) History of calculus notation.
- (6) (History, related rates) Lengthening Shadow: the story of related rates
- (7) (Mean value theorem) On a mean value theorem
- (8) (Geometry) Tangents without calculus
- (9) (Related rates) The falling ladder paradox
- (10) (Physics) How not to land at Lake Tahoe
- (11) (Physics, optimization) Refraction and reflection of light: Snell's law
- (12) (Physics, optimization) The calculus of rainbows
- (13) (Optimization) Do dogs know calculus?
- (14) (Optimization) A new wrinkle on an old folding problem
- (15) (History) History of calculus in Egypt, Greece, and India
- (16) (History, physics) Hyperbolic functions and their history
- (17) (History) Women in calculus.