Mathematical Models, Spring 2003

Final Project

DUE DATE: Monday, April 28th, in class.

The purpose of this project is for you to investigate, research, model and analyze a topic of your choice making use of any of the tools we have developed in the course. The problem you choose should be interesting to you and be something innovative. For example, a group of students at SUNY-Geneseo modeled the amount of time it takes to wait in line before giving blood at their local blood drives. They constructed and analyzed a model in hopes of finding ways to improve the waiting time for donors. They will be presenting their recommendations to the New York-Penn Region of the American Red Cross. A list of past modeling problems from the Mathematical Contest in Modeling is given in your textbook in Appendix A if you need some ideas.

The main goal is for you to present a problem you wish to model and questions you would like to investigate. Then, you should collect the necessary data needed to explore your problem, formulate a model based on this data, analyze and refine your model and formulate some answers to your initial questions. You will present your findings as a group with a 15 minute in-class presentation the last week of the semester.

Specifically, your report should include the following:

- An introduction stating the problem chosen, background information needed to understand the problem and specific questions and aims you plan to address.
- A preliminary model hypothesized from some set of assumptions (eg. geometric singularity or a law from physics).
- The collection of data for your problem, either by experiment or via some source (eg. journal article).
- The fitting of data to various models using several of the techniques discussed in class.
- A comparison and analyses of the different models you came up with and justification for choosing the final model.
- An interpretation of your model and honest assessment of its effectiveness. How well does it match the data or other models of its kind? What are its strengths and weaknesses? Does it display sensitivity to initial conditions? Is it robust or sensitive to the accuracy of the data?
- Some predictions and answers to questions set out to be investigated in the introduction.
- A conclusion summarizing your work, discoveries, successes and failures. What might you investigate if you were to do future research?
- A list of references (both animate and inanimate) used anywhere during the course of completing your project.

It is **required** that you work in a group of two or three people. Any help you receive from a source other than your lab partner(s) should be acknowledged in your report. For example, a textbook, web site, another student, etc. should all be appropriately referenced at the end of

your report. The project should be typed although you do not have to typeset your mathematical notation. For example, you can leave space for a graph, computations, tables, etc. and then write it in by hand later. You can also include graphs or computations in an appendix at the end of your report. Your presentation is important and I should be able to clearly read and understand what you are saying. Spelling mistakes and sentence fragments, for example, should not occur. Only one project per group need be submitted.

Remember: A well-written report with a few tables and graphs to illustrate key points is far better than a sloppy report with too many figures.