

## Projects, Math 250

Here is a listing of some projects you might do- if you want to do something else, let me know. You'll be working in groups of 2-4 people- be sure to split up the workload, and keep in mind that you should spend a good portion of your time writing. You may use Maple or Matlab, but for simulating games of chance, Matlab is preferred (and I will assist you in coding).

- How does the NFL rate passers? It was a secret until someone deduced the ratings from a mathematical model.
- Blackjack simulation. Evaluate strategies for playing Blackjack- Can you come up with one that does not involve counting cards? You'll do a computer simulation of the game.
- Craps simulation. What are the odds of winning this popular game in the casinos? What if you change the dice? You'll do a computer simulation of the game.
- Baseball simulation. Given the statistics of two baseball teams, see if you would have been able to predict the outcome of the World Series.
- Predict the Stock Market. We'll try to model a difference equation based on past data to predict future values.
- Population with three species that interact to compete for food- a couple of them are predators.
- Is there a limit to human performance? Use world record swimming data to see if there is a point at which swimmers will not be able to do any better. This might include some nonlinear optimization.

Here is the timeline:

- Week 1: Decide on a project and a group. Collect all the data you might need. Write up an outline of what you're going to be doing. If you're doing a simulation, write up a flowchart as to what the code will do. DUE: FRIDAY, December 5th.
- Week 2: Run the simulations (or get your model together), and start writing the results. DUE: THURSDAY, December 11th. We will meet briefly in class.
- Week 3: During our scheduled final exam time, present your results.

We won't be meeting in class again until the 11th. I will meet with groups individually for the next two weeks.

## Project Grading Criteria

Turn in a complete write up of your project, together with printouts of Matlab code, Maple worksheets and/or plots. You should type up the report, but you can attach figures (be sure they are labelled clearly). DUE: During our regularly scheduled final exam time.

Particular grading criteria:

- Is the problem clearly stated? What questions will be answered using this model?
- Is the mathematical model or simulation clearly laid out? (This is organizational- be sure to give some thought as to how you present the development of your solution).
- Are the results clearly stated?
- Give a summary of the strengths and weaknesses of the model. How might it be improved?
- Spelling and grammar.
- Mathematics.
- General overview: The paper has a beginning, a middle, and an ending. The flow of ideas follows a logical progression.