

DATA 609 Fall 2016 Project Proposal

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For our Final Project we have selected **Option 1** as described in the course syllabus, which requires that we select three projects from three different chapters of the textbook, with each of the three selected projects requiring a different mathematical modeling method. The selected projects are identified below.

Chapters 1 - 5

From Chapters 1 - 5 we have selected **Chapter 5.3, Project #1**, which requires the use of **Monte Carlo Simulation**:

1. *Blackjack*—Construct and perform a Monte Carlo simulation of blackjack (also called twenty-one). The rules of blackjack are as follows:

Chapters 6 - 10

From Chapters 6 - 10 we have selected **Chapter 9.4, Project #4**, which requires the use of **Decision Theory**:

4. The NBC TV network earns an average of \$400,000 from a hit show and loses an average of \$100,000 on a flop (a show that cannot hold its rating and must be canceled). If the network airs a show without a market review, 25% turn out to be hits, and 75% are flops. For \$40,000, a market research firm can be hired to help determine whether the show will be a hit or a flop. If the show is actually going to be a hit, there is a 90% chance that the market research firm will predict a hit. If the show is going to be a flop, there is an 80% chance that the market research will predict the show to be a flop. Determine how the network can maximize its profits over the long haul.

Chapters 11 +

From chapters 11+ we have selected **Chapter 12.5, Project #2**, which requires the use of **Modeling with Systems of Differential Equations (Euler's Method)**:

2. Using the improved Euler's method, approximate the solution to the harvesting predator-prey problem in Problem 7. Compare the new solution to the one obtained in Problem 7 using the same step size $\Delta t = 1$ over the interval $0 \leq t \leq 4$. Graph the solution trajectories for both solutions.