

**MATH 615 EXTRA CREDIT**  
**DUE 12/16/2015**

**Assignment:** Create and analyze a situation that can be modeled using Markov chains. While different situations may have similarities, each person in the class who completes this assignment should construct and analyze their own *unique scenario*.

The entire assignment should be completed in Mathematica and must include:

- (1) An explicit description of the “rules” used in your scenario.
- (2) Calculations used to analyze the situation.
- (3) Interpretation of what these calculations actually mean. Include a discussion of how these may coincide and/or contradict what someone might “feel” should happen in the scenario.

Be sure to use the Text environment in Mathematica where appropriate.

**Note:** This is an open-ended assignment. This means there is no set parameters or guidelines for what you must include or should not include. You must decide what will make the assignment interesting.

**Possible Ideas:** The *Topic: Markov Chains* chapter in the textbook (p. 301) analyzes several different situations. You are encouraged to take one of those situations as a *starting point*, and then expand upon it by modifying the scenario.

For example, a fun idea is to come up with your own game of chance (think carnivals or Vegas), complete with lots of different possible scenarios. Make it sound so exciting and easy enough to win that you could take lots of money, on average, from a gambling addict. (I’m not encouraging you to steal anyone’s life savings, but it is the basis for a *huge* industry.)

**Tips:** Because you can work with Mathematica, you shouldn’t be too concerned about the sizes of your matrices. In order to construct and work with the matrices, it will probably be easiest to use the same techniques you have used throughout the semester. If, however, you are interested in working with very large matrices, there are a few commands you may find useful. You can get details in the Wolfram Documentation Center.

It is possible to work with individual entries in a matrix. If you have a matrix  $m$ , you can obtain the element in the  $i$ -th row,  $j$ -th column by using the command  $m[[i, j]]$ . The  $i$ -th row can be accessed via  $m[[i]]$ , and the  $j$ -th column accessed by  $m[[All, j]]$ . Finally, you can change an entry by  $m[[i, j]] = v$ . For example, you could make the (3, 2)-entry equal to 14 by  $m[[3, 2]] = 14$ .

The SparseArray command allows you to create a matrix by stating the matrix entries at specific positions, and the remaining positions will all be 0.

**How this counts towards your grade:** I will update this with specifics after I have analyze the current grades. But, I will have a system where it improves grades from quizzes, homework completion, or Mathematica assignments; mediocre assignments will help a little and good assignments will help more.