SM 233. Intro to applied math. Homework 4

Mrinal Raghupathi

Posted 1/26/2012

Submission deadline

Posted : Friday, 2/3/2012

Due : Tuesday 2/14/2012 at 2359

Revisions

- Fixed the due, date, it is Tuesday now.
- Fixed the typos in part 2

Problems

Markov chains

The homework this week has two parts. **You can ignore the filenaming conventions this week, since a function and its associated file must have the same name**

Part 1 First write a function called `isstochastic`. The function should accept a single argument called `P`. The argument will be a matrix. The program should test to see whether the matrix is stochastic and print out either true or false. Before you begin, remember that you do not control the matrices to which the function will be applied. You should remember to test whether the matrix is square. Comment your code well and explain what you are doing.

Part 2 The next program is a function called `gamble`. The goal of this program is to compute the stationary distribution of different versions of the Markov chain associated to the coin flipping game. The function gamble will take three arguments called `p, broke, rich`. The value of `p` is the transition probability between states as specified in the notes. The argument `broke` will be either

true or false and will determine what happens when we hit the state \$0. The argument `rich` will determine what happens when we hit the state \$3. If `broke` is true, then the chance of staying broke is 0.75 and the chance of getting a dollar is 0.25. If `broke` is false, then the chance of staying broke is 1. If the value of `rich` is true, then the chance of staying `rich` is 0.9 and the chance of losing a dollar is 0.1. If the value of `rich` is false, then the chance of staying rich is 1.

The function `gamble` should accept the above parameters, prints the transition matrix, computes the one-hundredth power of this matrix, and computes the stationary distribution(s). Note that it may help to write another function that tests whether the matrix is absorbing? Run your function for the following values

p	broke	rich
0.5	true	true
0.5	true	false
0.5	false	true
0.5	false	false

What similarities and differences do you observe. Put your writeup in a file called `thoughts.txt`