CE 412 – PROJECT 1
"MONTE CARLO SIMULATION- RANDOM MATRICES"

Matrix theory traditionally emphasizes matrices that consist of real and complex constants. But what if the elements of a matrix are random variables? Such matrices are referred to as "stochastic" or "random" matrices.

In this project, our emphasis will be limited to the following question: if the elements of a 3x3 matrix are independent random numbers with positive diagonal elements and negative off-diagonal elements, what is the probability that the matrix has a positive determinant? That is find the probability that

$$\begin{vmatrix} +u_{11} & -u_{12} & -u_{13} \\ -u_{21} & +u_{22} & -u_{23} \\ -u_{31} & -u_{32} & +u_{33} \end{vmatrix} > 0$$

where the u_{ij}'s are independent random numbers uniformly distributed between 0 and 1.

In order to calculate this probability, you may write a program which generates random matrices in a loop, count the number of these matrices that have a positive determinant and print the ratio of this count to the number of replications. In order to estimate the probability with some precision, it is reasonable to make one long run.

Project 1 Submission:
Name your program as *yournamePrj1.X* and submit your program along with a report to Blackboard by October 13th, 2016. The report should describe how you did the simulation, analysis of the results. You will also make a demo of your project in class. Late submissions up to one week has a penalty of 50%. Late submissions beyond one week will not be accepted.

Project 1 Grading:
- Project Report 30%
- Program 70% (If your program does not produce correct results, you might only get at most 35%)