Homework 8- Math 225
Due Tuesday, Apr. 7th

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Office hours: by appointment.

www.math.duke.edu/~mauro/teaching.html

I prefer homework written in pen rather than pencil. The handwriting and organization of your work on the page should be clear. Include appropriate explanations for what you are doing in your calculations and why, and what conclusions you draw or observations you make.

The homework should include a printout of the Matlab/C/Fortran code you used and of the code output (including figures as needed/requested). Also send me a copy of the code via e-mail: if you have multiple files, compress them into a unique zip file. Name the file as FamilyName_FirstInitial_Homework_xx.zip, where xx is the homework number. This will apply to all the future homework as well. Please use the subject "Math 225 homework" in your e-mail.

1. Use a random number generator to generate N pseudo-random numbers uniformly $Unif([0,1])$. Partition the interval $[0,1]$ into subintervals of equal length 10^{-2} and count the number of generated numbers falling into each subinterval. Do this for $N = 10^3, 10^4, 10^5$. Plot a histogram (i.e. proportion of numbers in each subinterval): does it resemble the graph of the density function of a $Unif([0,1])$ random variable? Evaluate the sample mean and variance of the generated numbers: how do they compare with the true mean and variance?

2. Repeat the above exercise, but with a normal $N(0,1)$ variable.

3. Simulate 20 batches of length 100 of $Unif([0,1])$ pseudo-random numbers and evaluate the 90% confidence interval for their mean value.