HOMEWORK
IE 526: Simulation
Fall 2018
(Dr. Xueping Li)

THE UNIVERSITY OF TENNESSEE KNOXVILLE

Homework Assignment (#2)

1: Generate 10000 random numbers using the LCM (LCG) method. Feel free to use any programming language or software package. (Tip: R (*Recommened*), Python or Excel may be handy here).

- Use X_0=27, a=17, c=9, and m=10000.

- Plot a histogram of the above random numbers (RN) and comment on the quality of the RNs.

- Use K-S test to test the uniformity of the first 10 RNs. Use Alpha=0.05.

- Generate 10000 variates following the exponential distribution with λ=10 based on the above RNs using inverse-transform. Plot a histogram of these variates.

- Use T-test to test the first 20 RNs. H_0: $\bar{X} = 0.5$; H_1: $\bar{X} \neq 0.5$; α=0.01.

- [Optional. Bonus.] Use X_0=0, a=6364136223846793005, c=1442695040888963407, and m=10000. Generate 10000 random numbers and plot a histogram.

2: Estimate the value of π using random numbers only. You may use the numbers that you generated in Question #1, or you may generate more numbers for higher precision. (*Tip:* you can conduct a Monte Carlo experiment by throwing darts at a board blindfolded. Or find other creative ways.)

Submission Guideline: Summarize your work in a report (in Word or PDF format), including charts, output, explanations and source code. Attach your source code.
1) Submit to Canvas.
2) Email your homework to ie526.utk@gmail.com.
When you have multiple files, please zip them into one single file. 7zip (http://www.7-zip.org/) is recommended and .7z file extension is suggested. Note that occasionally, UTK email system may filter emails with attachments, especially when attachments are like .zip and/or with executable files. You should receive an email notification if your email goes through.