

IE413
COMPUTER SIMULATION
Assignment #4 Due: March 28, 2018

1) Consider the LCG available on SIGMA.

a) Estimate its mean and variance. Clearly state how many observations you used and the expressions you used for your estimates.

b) Apply any one test to the LCG for uniformity. Apply any one test to the LCG for independence.

State and describe your testing procedures carefully. In addition, state clearly how many observations you used to obtain your results, and any other information you used to make your assessment. State the seeds that you used for your runs/experiments.

2) Two people play tennis. On each player's serve, two things can happen. If they get their first serve in, they win the point (W1) or lose the point (L1). If they do not get their first serve in, assume they always get their second serve in, and either win the point (W2) or lose the point (L2). The probabilities of these events occurring for each player are:

	W1	L1	W2	L2
Player #1	.75	.25	.65	.35
Player #2	.95	.05	.20	.80

The probability that player #1 gets their first serve in is .75, while the probability that player #2 gets their first serve in is .45. A game is finished when a player scores four points and wins by two or more points. The match is finished when a player wins six games and wins by two or more games. For those of you familiar with professional tennis, there are no "tie breakers", hence a player must win by at least two games to win the match.

Construct a static simulation model for this tennis game. Write a computer simulation that plays this game. Answer the following questions:

- What percentage of the time does player #1 (#2) win the match?
- Is there an advantage to serving first?
- If player #2 could get the first serve in with probability p , and player #1 serves first, is there a value for p such that $P\{\text{Player \#1 wins the match}\} = P\{\text{Player \#2 wins the match}\} = .5$.

Justify all your answers. Clearly state how you used the simulation model to answer the questions. State precisely which information you used from the simulation model, such as, for example, how many matches you ran with the simulation, what estimators you used, and any other pertinent information.