AALTO UNIV. SCHOOL OF ELECTRICAL ENGINEERING
COMNET Department
ELEC-E7460 Modeling and Simulation, fall 2018

Exercise 1
28.09.2018
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1. Generate, by using the linear congruential method (LCG), a sequence of four pseudo random numbers. Use initial values $X_0 = 11,\ a = 5,\ c = 3$, and $m = 61$.

2. Some further questions:

   a) What is the length of the random number sequence generated by the LCG algorithm with the above parameters?

   b) Does the sequence length depend on X_0?

   c) How would you change the value of m to obtain a full length period from the generator? (i.e., a sequence of length m different numbers)?

   (Hint! Use Excel, matlab or any software to simulate the LCG algorithm so you do not need to generate the numbers by hand.)

3. What is the sequence length of the multiplicative congruential generator (MCG) with parameters $a = 7$ and $m = 61$? (Again, use some software to simulate the MCG generator.)

4. A random number generator of a computer draws samples from a $\mathrm{U}(0, 1)$ distribution. Assume that the generator has generated a sample $u = 0.77306$. What is the corresponding value of a random variable X, when X is the number of trials before the first six appears when rolling a dice?

5. Apply the inverse transformation method to generate rv:s from the Weibull distribution with the cumulative distribution function

$$F(x) = 1 - e^{-(\lambda x)^{\beta}}.$$

   Also, give the algorithm to generate the samples.