Lab Assignment - 2

Instructor: Dr. Arabin Kumar Dey

1 Due date:

- 18/1/2013.

2 Notes:

- Make a proper documentation preferably in latex or using some other software and submit the printout of the report in .pdf form.
- Each student needs to write his/ her own solutions, even though discussions of the assignments between students are encouraged.

3 Assignments:

1. All the following problems are for the following general linear congruence generator :

$$x_{i+1} = (ax_i + b) \mod m$$

$$u_{i+1} = x_{i+1}/m$$

Generate the sequence of numbers x_i for a = 6, b = 0, m = 11 and x_0 ranging from 0 to 10. Also, generate the sequence of numbers x_i for a = 3, b = 0, m = 11, and x_0 ranging from 0 to 10. Observe the sequence of numbers generated and observe the

repetition of values. Tabulate these for each group of values. How many distinct values are appearing before repetitions? Which, in your view, are the best choices and why? (Use only C or C++ code)

2. Generate a sequence u_i with m = 244944, a = 1597, 51749 (take x_0 as per your choice). Try to group the values in the ranges 0 - 0.05, 0.05 - 0.10, 0.10 - 0.15, ... and see their frequencies (i.e. the number of values falling in a group). For at least 5 different values of the number of values generated, tabulate the frequencies in each case, draw bar diagrams of these data and put in your observations. (Use both R and C / C ++ code)

3. Generate a sequence u_i with a = 1229, b = 1, m = 2048. Plot in a two-dimensional graph the points (u_{i-1}, u_i), i.e., the points (u_1, u_2), (u_2, u_3), (u_3, u_4), $\cdots$ What are your observations?