
General Instructions for MA 323 (Applicable for all lab assignments for the first part of the course)

- *Your program should be written in such a way that there is only one program for each question and all the outputs for each question should be displayed by running the program once only.*
- *Put down all your observations and outputs of the questions asked in a single Word/LaTeX document. Finally create a pdf file from the Word/LaTeX file.*
- *The file names should be your roll numeber and name seprated by "_". If your roll number is 100 and your name is xyz then file names should be 100_xyz for output files (in pdf) and 100_xyz_q1 and 100_xyz_q2 etc for programs. Write your full name and roll number at the top of the output file.*
- *All your programs (executable) and output files (in pdf format) must be submitted as Microsoft Teams assignment.*
- *Each question carries 10 marks.*

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

$$\begin{aligned} x_{i+1} &= (ax_i + b) \bmod m \\ u_{i+1} &= x_{i+1}/m.. \end{aligned}$$

1. 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 appear before repetitions? Which, in your opinion, are the best choices and why?

2. Generate a sequence u_i with $m = 244944,\ a = 1597,\ 51749$ (choosing x_0 as per your choice). Then group the values in the ranges $0 - 0.05,\ 0.05 - 0.10,\ 0.10 - 0.15\ \ldots$ and observe their frequencies (*i.e.,* the number of values falling in each group). For 5 different x_0 values, tabulate the frequencies in each case, draw the bar diagrams for these data and put in your observations.

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 $(u_1, u_2),\ (u_2, u_3),\ (u_3, u_4),\ \ldots$.

Submission Deadline: 9 September 2020, 11:59 PM