MA323(Lab-01)

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Problem 1

Case 1: a= 6, b= 0, m= 11

For all x0(from 1 to 10), no. of distinct values before repitition are 10.

For x0= 0, all corresponding x are 0.

Case 2: a= 3, b= 0, m= 11

For all x0(from 1 to 10), no. of distinct values before repitition are 5.

For x0= 0, all corresponding x are 0.

So considering both cases, Case 1(a= 6) is a better choice for random function generator because generators with longer period are preferred.

Below figures give output for code (python 180123060_Jatin_q1.py):

Part A) For a=6, b=0, m=11

x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10
0	0	0	0	0	0	0	0	0	0	0
1	6	3	7	9	10	5	8	4	2	1
2	1	6	3	7	9	10	5	8	4	2
3	7	9	10	5	8	4	2	1	6	3
4	2	1	6	3	7	9	10	5	8	4
5	8	4	2	1	6	3	7	9	10	5
6	3	7	9	10	5	8	4	2	1	6
7	9	10	5	8	4	2	1	6	3	7
8	4	2	1	6	3	7	9	10	5	8
9	10	5	8	4	2	1	6	3	7	9
10	5	8	4	2	1	6	3	7	9	10

Part B) For a=3, b=0, m=11

x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10
0	0	0	0	0	0	0	0	0	0	0
1	3	9	5	4	1	3	9	5	4	1
2	6	7	10	8	2	6	7	10	8	2
3	9	5	4	1	3	9	5	4	1	3
4	1	3	9	5	4	1	3	9	5	4
5	4	1	3	9	5	4	1	3	9	5
6	7	10	8	2	6	7	10	8	2	6
7	10	8	2	6	7	10	8	2	6	7
8	2	6	7	10	8	2	6	7	10	8
9	5	4	1	3	9	5	4	1	3	9
10	8	2	6	7	10	8	2	6	7	10

Problem 2

Case 1) a= 1597, m= 244944

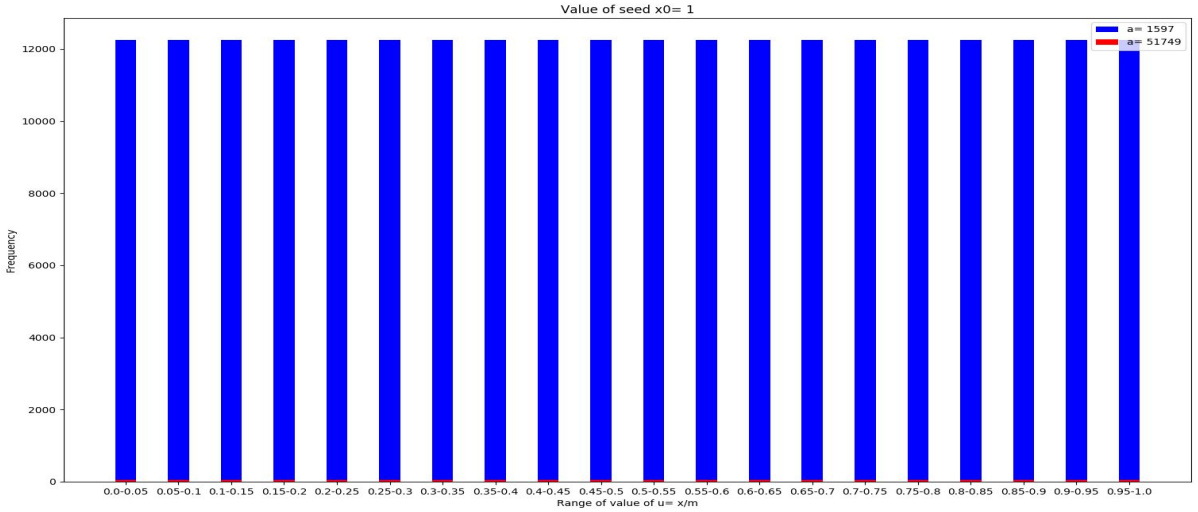
For any x0(except 0), period of random generator is 244943. (For code purpose taken x0 are 1, 2, 3, 4, 5). Frequency in every range was nearly equal(almost 12,247 no. fall in every range).

Case 2) a= 51749, m= 244944

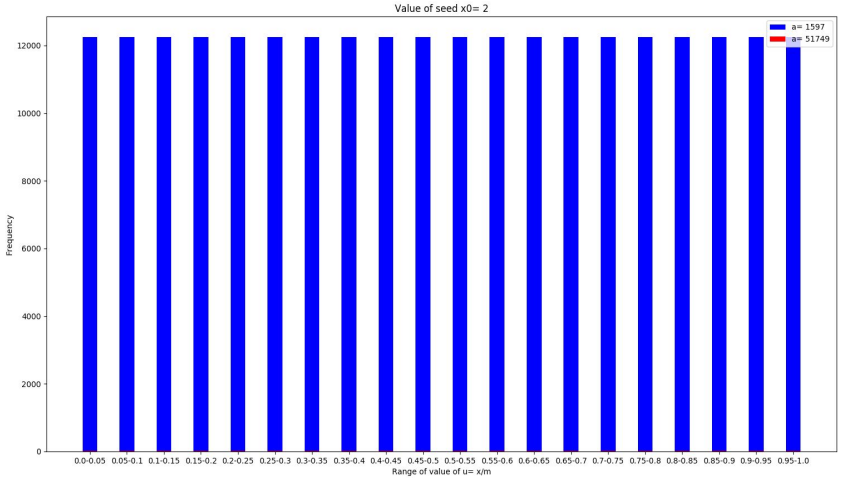
For all x0(from 1 to 5), period was different. Frequency in every range was nearly equal but Frequency corresponding to Case 1 was very less. Due to which for all x0(from 1 to 5), bars for this case are very small.

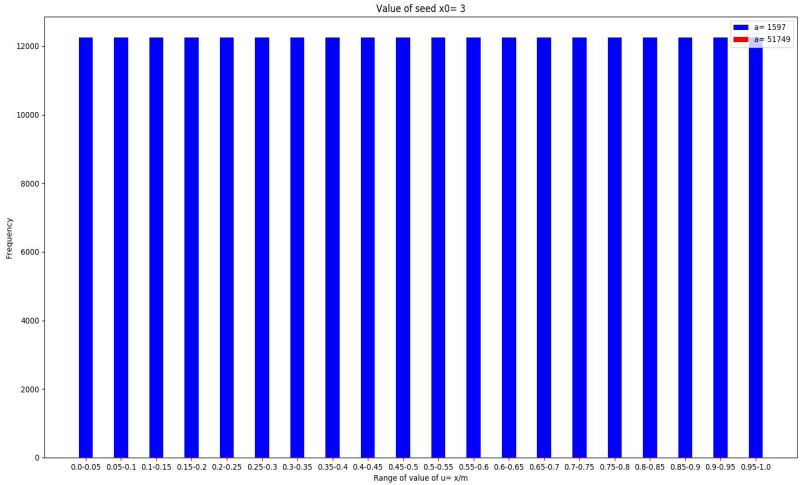
Below are 5 bar graph corresponding to x0= 1, 2, 3, 4, 5. (python 180123060_Jatin_q2.py)

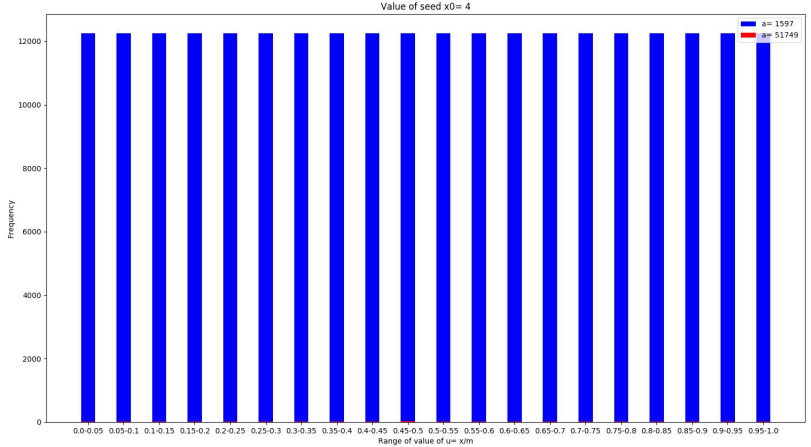
For x0= 1, =>

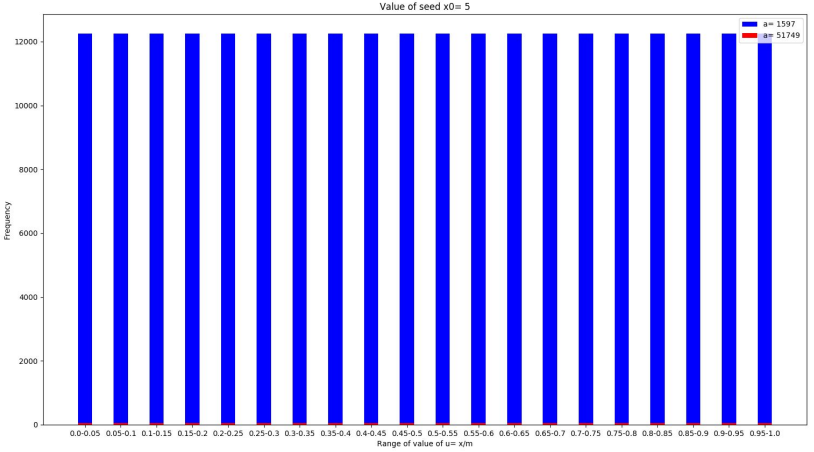


Red bars are very small because of frequency of every range in Case 2 is very small as compared to Case 1.









Frequency table for a= 1597

For a=1597

x0	0.0-0.05	0.05-0.1	0.1-0.15	0.15-0.2	0.2-0.25	0.25-0.3	0.3-0.35	0.35-0.4	0.4-0.45	0.45-0.5	0.5-0.55	0.55-0.6	0.6-0.65	0.65-0.7	0.7-0.75	0.75-0.8	0.8-0.85	0.85-0.9	0.9-0.95	0.95-1.0
1	12247	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247
2	12247	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247
3	12247	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247
4	12247	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247
5	12247	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247	12248	12247	12247	12247	12247

Frequency table for a= 51749

For a=51749

x0	0.0-0.05	0.05-0.1	0.1-0.15	0.15-0.2	0.2-0.25	0.25-0.3	0.3-0.35	0.35-0.4	0.4-0.45	0.45-0.5	0.5-0.55	0.55-0.6	0.6-0.65	0.65-0.7	0.7-0.75	0.75-0.8	0.8-0.85	0.85-0.9	0.9-0.95	0.95-1.0
1	48	48	49	48	48	49	48	49	49	49	49	48	49	48	48	49	48	49	49	49
2	24	24	24	24	25	24	24	24	24	24	25	24	24	24	25	24	25	24	25	24
3	14	17	17	15	16	17	16	16	17	16	15	17	17	15	16	17	16	16	17	16
4	25	24	24	24	24	24	24	24	24	26	24	24	24	25	24	24	25	24	24	24
5	48	49	49	48	48	49	49	49	48	48	49	49	49	48	48	49	49	49	48	48

Problem 3

Graph b/w u(i-1) and u(i) after running code (python 180123060_Jatin_q3.py)