MONTE CARLO STIMULATION LAB 1: REPORT

By: Kabir Yadav
Roll No - 200123027

Ques 1:

X0	a,b,m	numbers	distinct values before repitition
0	6,0,11	(0,)	1
1	6,0,11	(6, 3, 7, 9, 10, 5, 8, 4, 2, 1)	10
2	6,0,11	(1, 6, 3, 7, 9, 10, 5, 8, 4, 2)	10
3	6,0,11	(7, 9, 10, 5, 8, 4, 2, 1, 6, 3)	10
4	6,0,11	(2, 1, 6, 3, 7, 9, 10, 5, 8, 4)	10
5	6,0,11	(8, 4, 2, 1, 6, 3, 7, 9, 10, 5)	10
6	6,0,11	(3, 7, 9, 10, 5, 8, 4, 2, 1, 6)	10
7	6,0,11	(9, 10, 5, 8, 4, 2, 1, 6, 3, 7)	10
8	6,0,11	(4, 2, 1, 6, 3, 7, 9, 10, 5, 8)	10
9	6,0,11	(10, 5, 8, 4, 2, 1, 6, 3, 7, 9)	10
10	6,0,11	(5, 8, 4, 2, 1, 6, 3, 7, 9, 10)	10
0	3,0,11	(0,)	1
1	3,0,11	(3, 9, 5, 4, 1)	5
2	3,0,11	(6, 7, 10, 8, 2)	5
3	3,0,11	(9, 5, 4, 1, 3)	5
4	3,0,11	(1, 3, 9, 5, 4)	5
5	3,0,11	(4, 1, 3, 9, 5)	5
6	3,0,11	(7, 10, 8, 2, 6)	5
7	3,0,11	(10, 8, 2, 6, 7)	5
8	3,0,11	(2, 6, 7, 10, 8)	5
9	3,0,11	(5, 4, 1, 3, 9)	5
10	3,0,11	(8, 2, 6, 7, 10)	5

Observation: Initially as both x0 and b are zero so we only get one number that is 0, but as We increase x0 we start to get 10 numbers for every value of x0 till 10 when (a, b, m) = (6, 0, 11). Same is the case for (a, b, m) = (3, 0, 11) but as x0 go beyond 0 we start to get 5 distinct values before repetition starts. We can also observe that when (a, b, m) = (6, 0, 11) when we go from x0 =1 10 we are getting the same sequence but it starts from different numbers.

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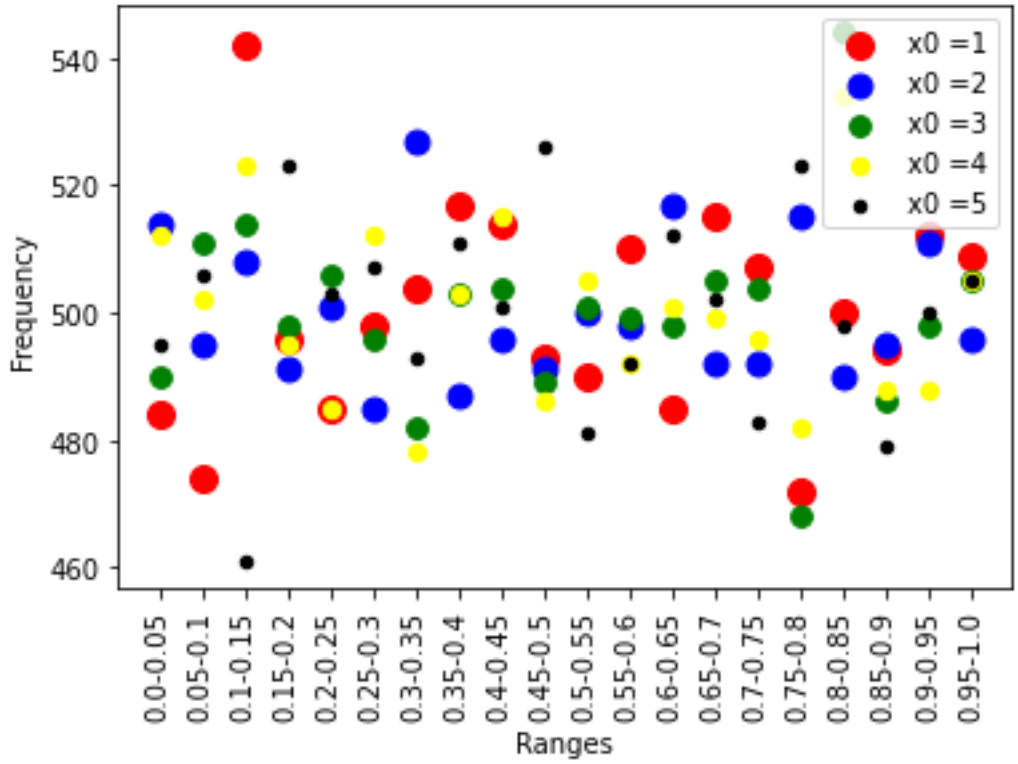
Ques 2:



Observation: (I found that scatter plots give better intuition of what is happening for different values of x0, so I chose this) All of the values lie in a very close range that is (493, 510), there is max error of 6-7 in same ranges for different x0 and in different ranges for same x0.

S.no.	x0	Range	Frequency
0	1	0.0-0.05	484
1	1	0.05-0.1	474
2	1	0.1-0.15	542
3	1	0.15-0.2	496
4	1	0.2-0.25	485
5	1	0.25-0.3	498
6	1	0.3-0.35	504
7	1	0.35-0.4	517
8	1	0.4-0.45	514
9	1	0.45-0.5	493
10	1	0.5-0.55	490
11	1	0.55-0.6	510
12	1	0.6-0.65	485

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13	1	0.65-0.7	515
14	1	0.7-0.75	507
15	1	0.75-0.8	472
16	1	0.8-0.85	500
17	1	0.85-0.9	494
18	1	0.9-0.95	512
19	1	0.95-1.0	509
20	2	0.0-0.05	514
21	2	0.05-0.1	495
22	2	0.1-0.15	508
23	2	0.15-0.2	491
24	2	0.2-0.25	501
25	2	0.25-0.3	485
26	2	0.3-0.35	527
27	2	0.35-0.4	487
28	2	0.4-0.45	496
29	2	0.45-0.5	491
30	2	0.5-0.55	500
31	2	0.55-0.6	498
32	2	0.6-0.65	517
33	2	0.65-0.7	492
34	2	0.7-0.75	492
35	2	0.75-0.8	515
36	2	0.8-0.85	490
37	2	0.85-0.9	495
38	2	0.9-0.95	511
39	2	0.95-1.0	496
40	3	0.0-0.05	490
41	3	0.05-0.1	511
42	3	0.1-0.15	514
43	3	0.15-0.2	498
44	3	0.2-0.25	506
45	3	0.25-0.3	496
46	3	0.3-0.35	482
47	3	0.35-0.4	503
48	3	0.4-0.45	504
49	3	0.45-0.5	489
50	3	0.5-0.55	501
51	3	0.55-0.6	499
52	3	0.6-0.65	498
53	3	0.65-0.7	505
54	3	0.7-0.75	504
55	3	0.75-0.8	468
56	3	0.8-0.85	544

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57	3	0.85-0.9	486
58	3	0.9-0.95	498
59	3	0.95-1.0	505
60	4	0.0-0.05	512
61	4	0.05-0.1	502
62	4	0.1-0.15	523
63	4	0.15-0.2	495
64	4	0.2-0.25	485
65	4	0.25-0.3	512
66	4	0.3-0.35	478
67	4	0.35-0.4	503
68	4	0.4-0.45	515
69	4	0.45-0.5	486
70	4	0.5-0.55	505
71	4	0.55-0.6	492
72	4	0.6-0.65	501
73	4	0.65-0.7	499
74	4	0.7-0.75	496
75	4	0.75-0.8	482
76	4	0.8-0.85	534
77	4	0.85-0.9	488
78	4	0.9-0.95	488
79	4	0.95-1.0	505
80	5	0.0-0.05	495
81	5	0.05-0.1	506
82	5	0.1-0.15	461
83	5	0.15-0.2	523
84	5	0.2-0.25	503
85	5	0.25-0.3	507
86	5	0.3-0.35	493
87	5	0.35-0.4	511
88	5	0.4-0.45	501
89	5	0.45-0.5	526
90	5	0.5-0.55	481
91	5	0.55-0.6	492
92	5	0.6-0.65	512
93	5	0.65-0.7	502
94	5	0.7-0.75	483
95	5	0.75-0.8	523
96	5	0.8-0.85	498
97	5	0.85-0.9	479
98	5	0.9-0.95	500
99	5	0.95-1.0	505

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Ques 3: