LAB 1

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Question 1

For a=6,b=0,m=11 and x_0 from 0 to 10.

	0	1	2	3	4	5	6	7	8	9
0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	6.0	3.0	7.0	9.0	10.0	5.0	8.0	4.0	2.0
2	2	1.0	6.0	3.0	7.0	9.0	10.0	5.0	8.0	4.0
3	3	7.0	9.0	10.0	5.0	8.0	4.0	2.0	1.0	6.0
4	4	2.0	1.0	6.0	3.0	7.0	9.0	10.0	5.0	8.0
5	5	8.0	4.0	2.0	1.0	6.0	3.0	7.0	9.0	10.0
6	6	3.0	7.0	9.0	10.0	5.0	8.0	4.0	2.0	1.0
7	7	9.0	10.0	5.0	8.0	4.0	2.0	1.0	6.0	3.0
8	8	4.0	2.0	1.0	6.0	3.0	7.0	9.0	10.0	5.0
9	9	10.0	5.0	8.0	4.0	2.0	1.0	6.0	3.0	7.0
10	10	5.0	8.0	4.0	2.0	1.0	6.0	3.0	7.0	9.0

Notice that for $x_0 = 0$ all the values in the sequence are zero and 10 distinct values repeat for other x_0

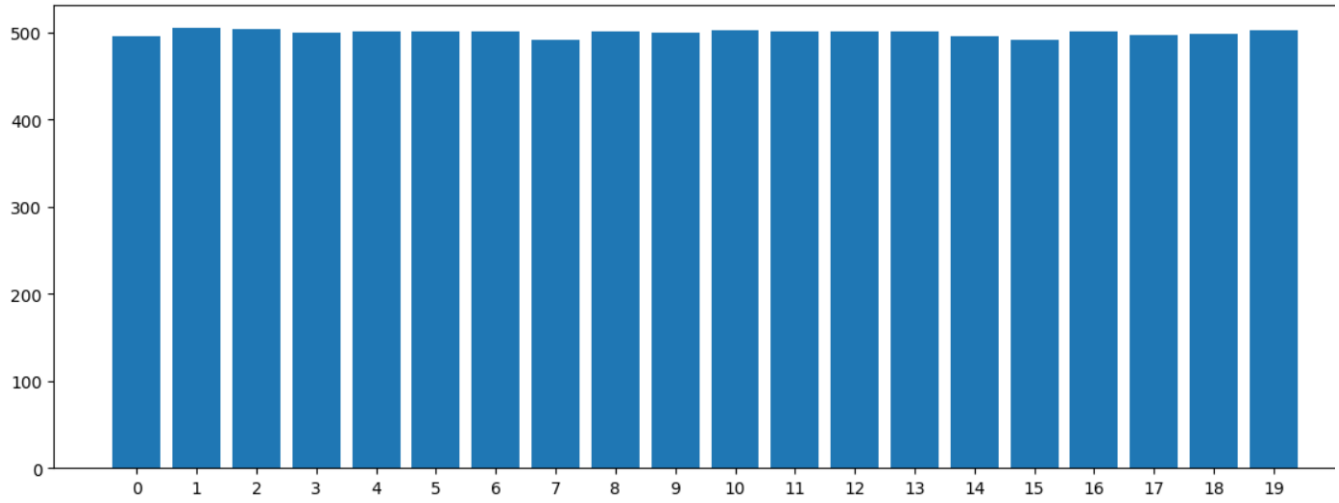
For a=3,b=0,m=11 and x_0 from 0 to 10.

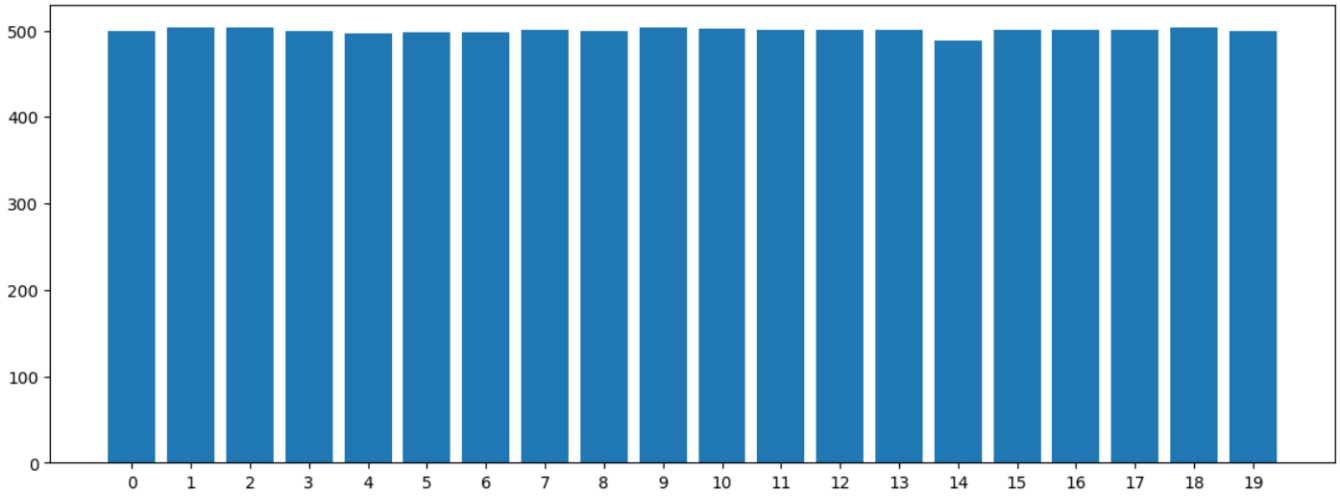
	0	1	2	3	4
0	0	0.0	0.0	0.0	0.0
1	1	3.0	9.0	5.0	4.0
2	2	6.0	7.0	10.0	8.0
3	3	9.0	5.0	4.0	1.0
4	4	1.0	3.0	9.0	5.0
5	5	4.0	1.0	3.0	9.0
6	6	7.0	10.0	8.0	2.0
7	7	10.0	8.0	2.0	6.0
8	8	2.0	6.0	7.0	10.0
9	9	5.0	4.0	1.0	3.0
10	10	8.0	2.0	6.0	7.0

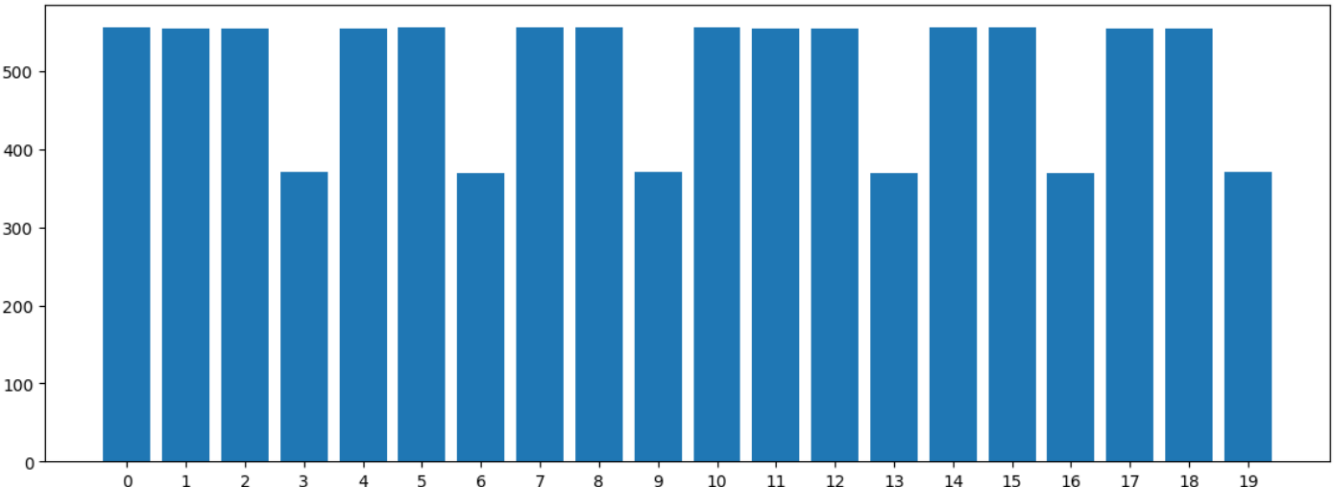
Notice that for $x_0 = 0$ all the values in the sequence are zero and 4 distinct values repeat for other x_0
The set of value a=6,b=0,m=11 is the best choice because the number of distinct values before repetition is more

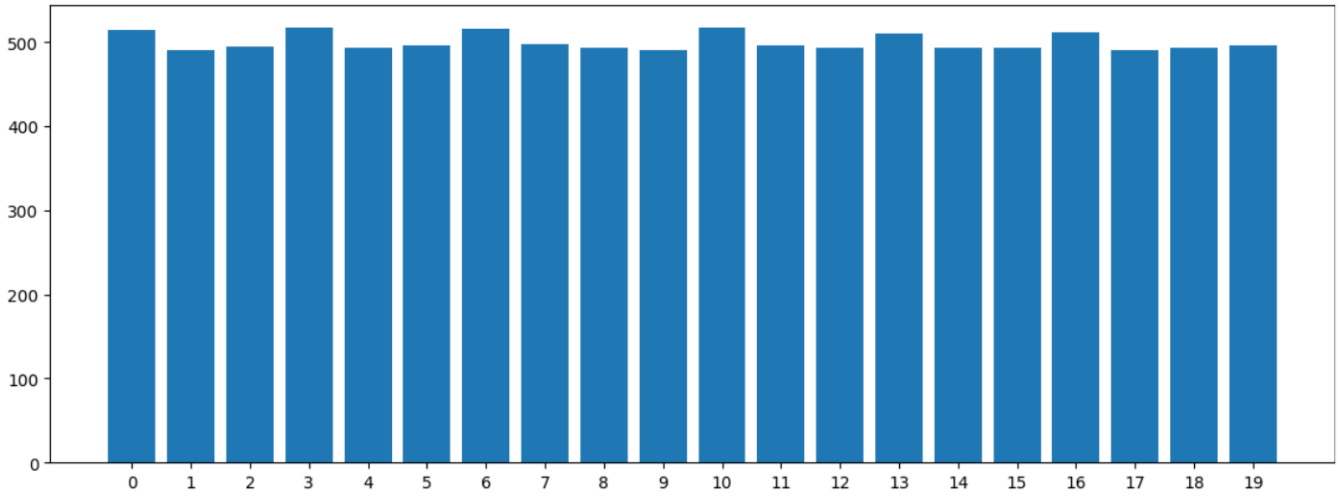
Question 2

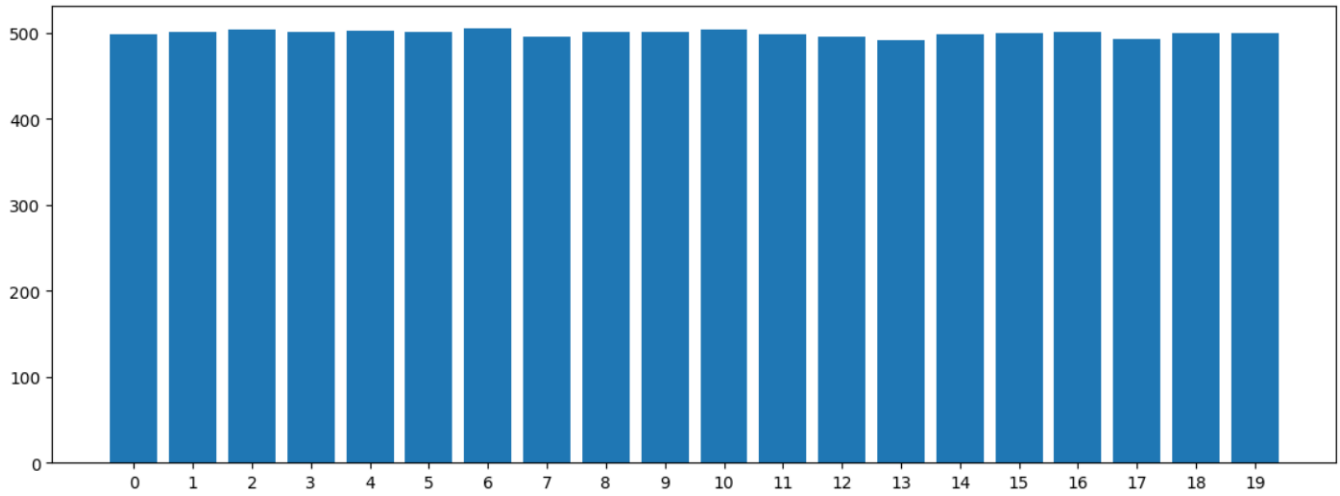
For m=244944, a=1597, and $x_0 = 50, 98, 54, 6, 34$







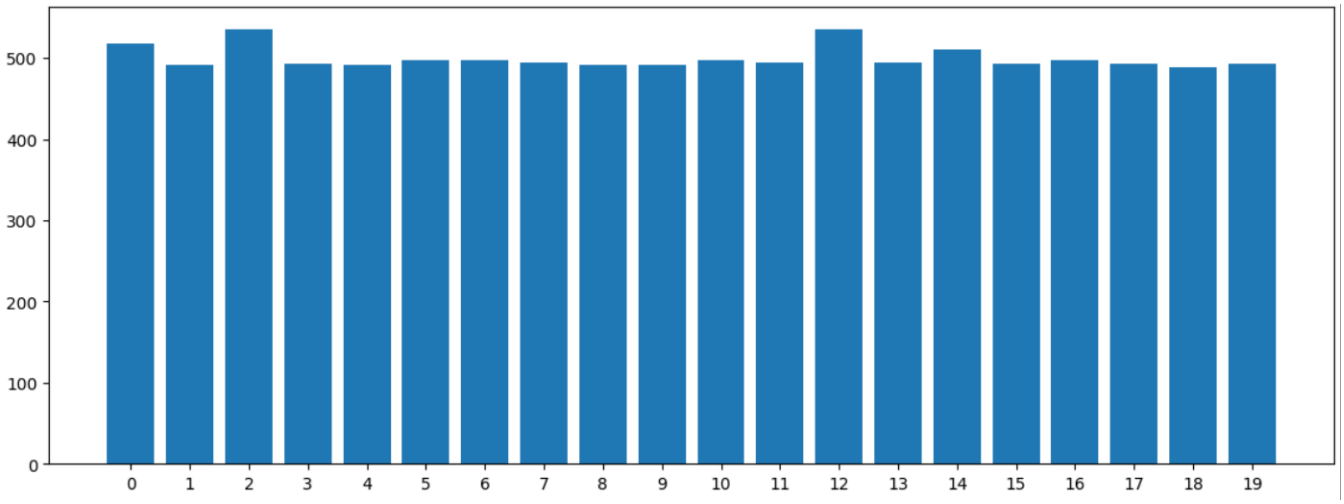


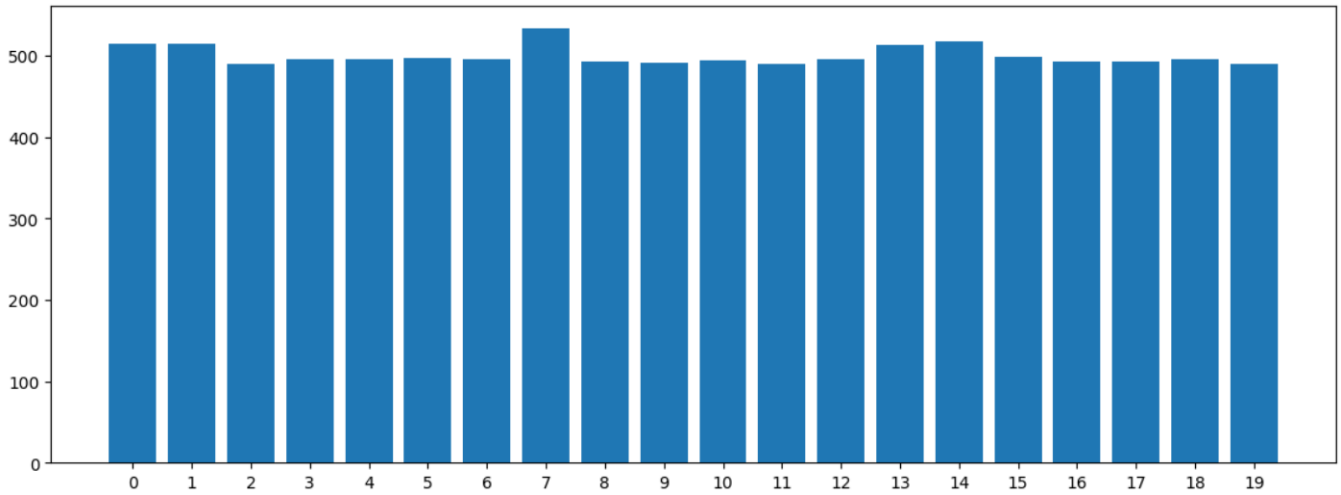


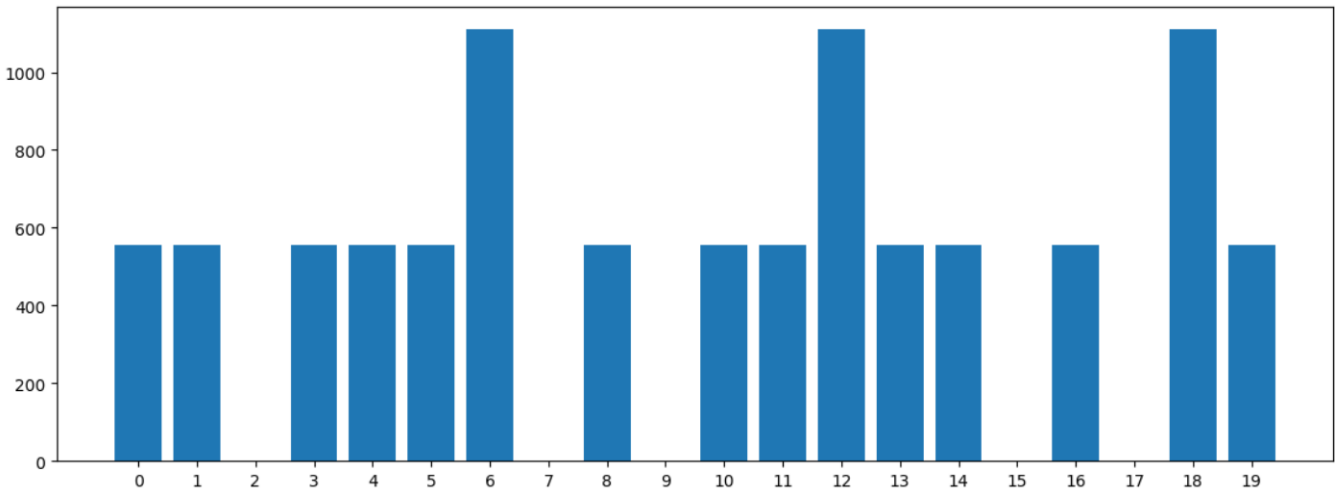
	[0.0,0.05)	[0.05,0.1)	[0.1,0.15)	[0.15,0.2)	[0.2,0.25)	[0.25,0.3)	[0.3,0.35)	[0.35,0.4)	[0.4,0.45)	[0.45,0.5)	[0.5,0.55)	[0.55,0.6)
50	496	506	504	500	502	501	502	492	502	500	503	501
98	500	504	503	499	496	498	498	501	499	503	502	501
54	556	555	555	371	555	556	370	557	556	371	556	555
6	515	491	495	517	494	496	516	497	493	490	518	496
34	498	502	504	502	503	501	506	496	502	502	504	499

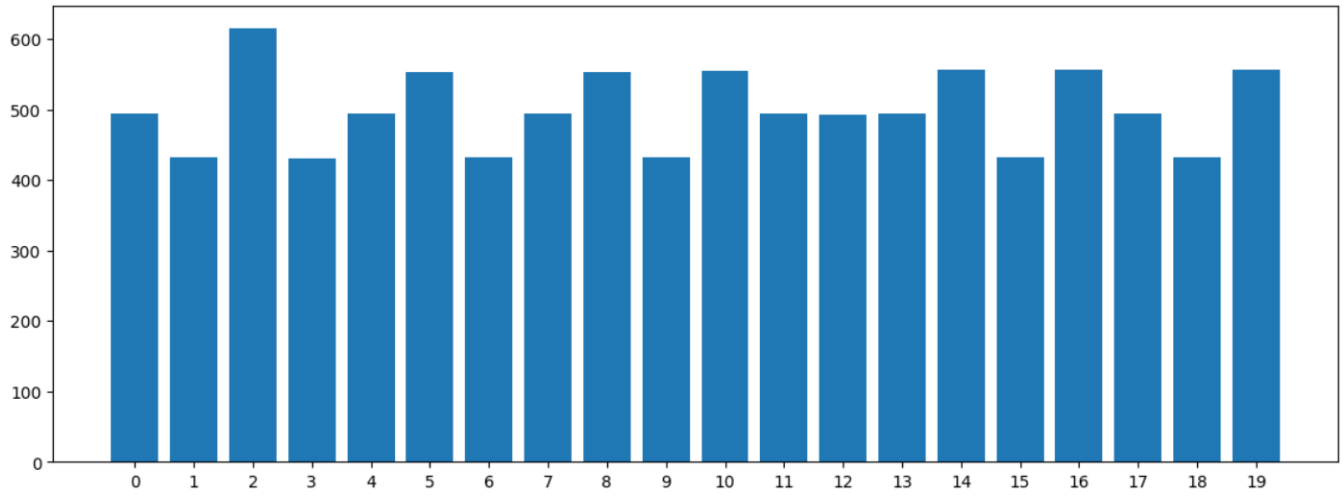
[0.6,0.65)	[0.65,0.7)	[0.7,0.75)	[0.75,0.8)	[0.8,0.85)	[0.85,0.9)	[0.9,0.95)	[0.95,1.0)
502	501	496	492	502	497	499	503
501	501	488	501	501	501	504	500
555	370	556	556	370	555	555	371
494	511	493	493	512	491	493	496
496	492	499	500	502	493	500	500

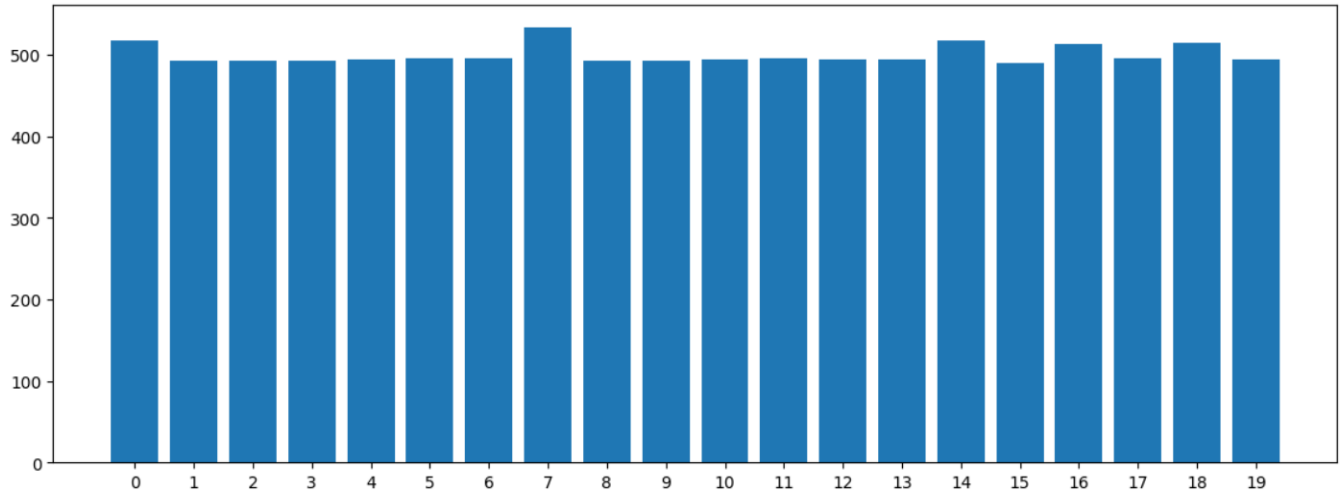
For m=244944, a=51749, and $x_0 = 50, 98, 54, 6, 34$











	[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)
50	518	492	536	493	492	497	498	495	491	491	498	495
98	514	515	490	496	496	497	495	534	492	491	494	490
54	556	556	0	555	556	555	1112	0	556	0	556	556
6	495	433	616	431	495	554	432	494	553	432	555	494
34	517	493	492	492	494	496	496	534	493	492	494	496

[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)
535	494	511	493	498	493	488	493
496	513	518	499	493	493	495	490
1111	555	555	0	556	0	1110	556
493	494	557	432	557	495	432	557
494	494	517	490	513	495	515	494

The numbers are generated almost uniformly for a=1597 but not for a=51749

Question 3

x_0 was taken to be 50