LAB 2

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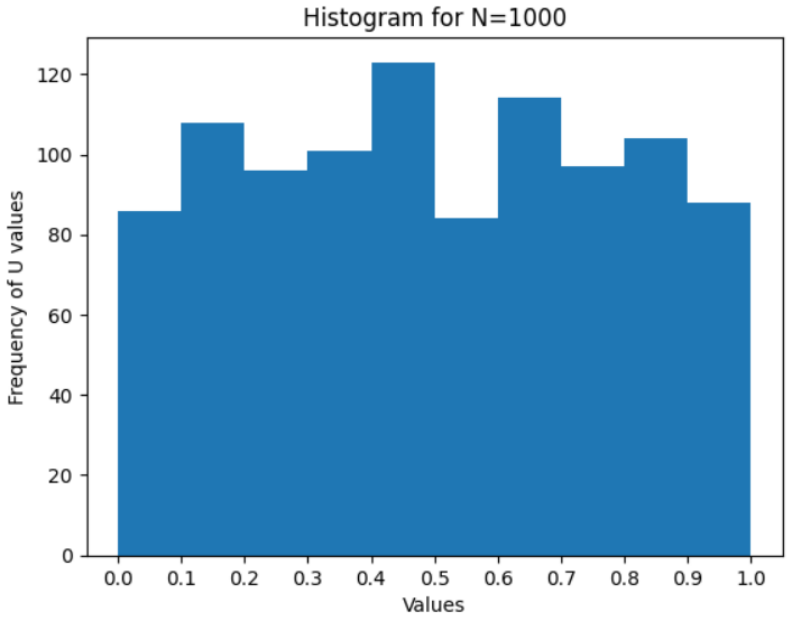
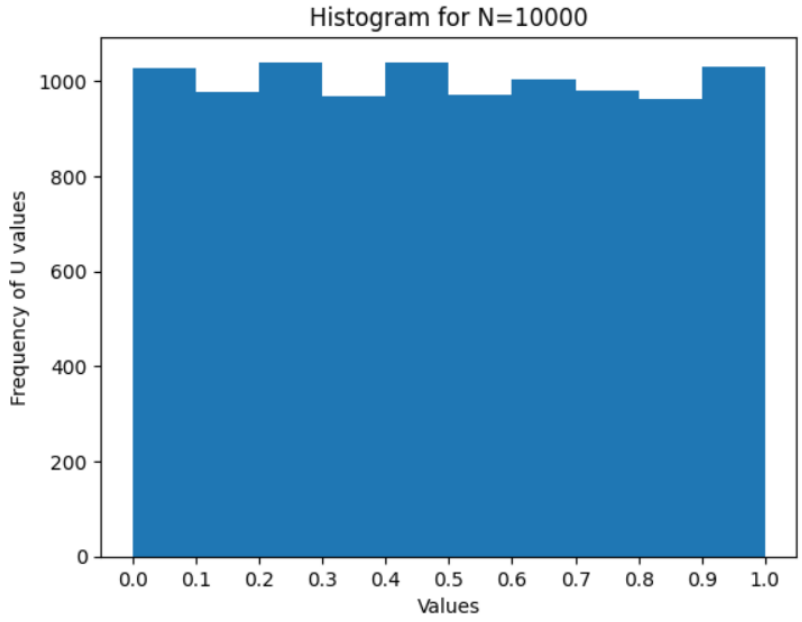
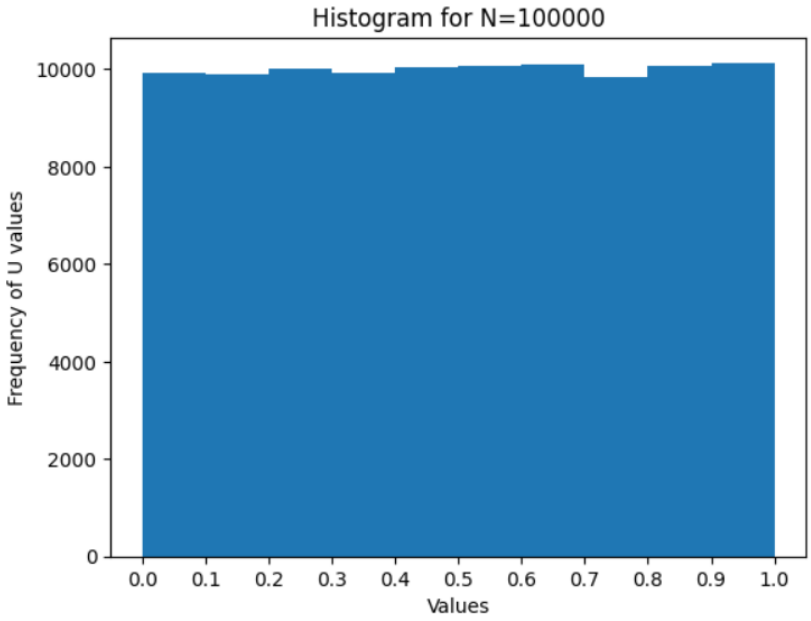
Question 1

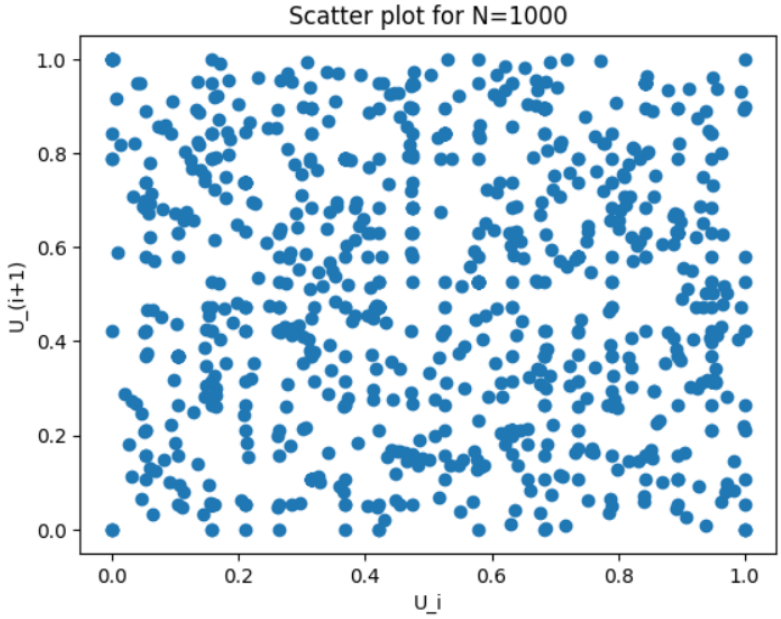
c)

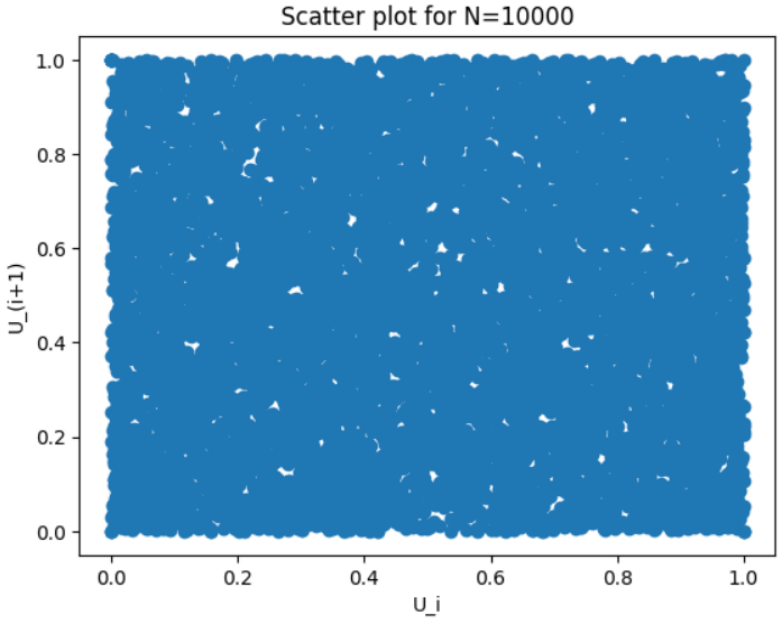


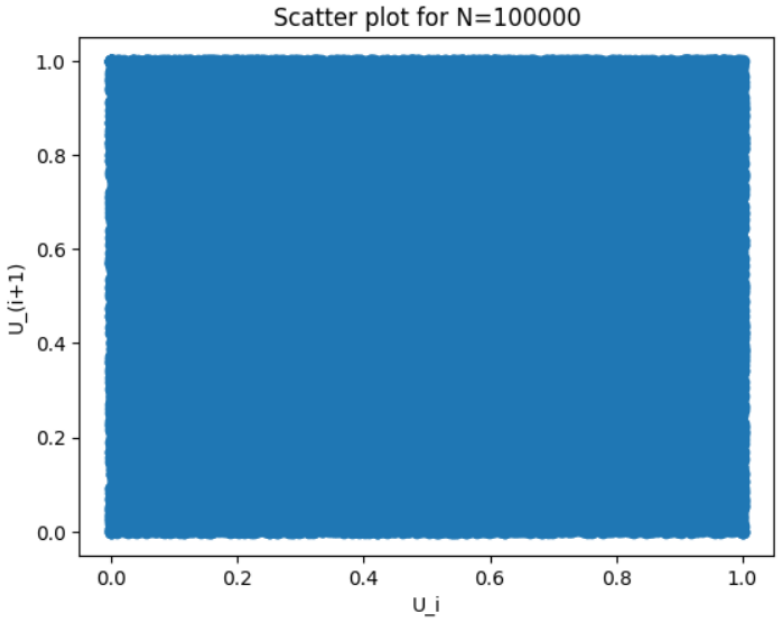

Histogram for N=10000
Frequency of U values
Values
0
200
400
600
800
1000
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0


Histogram for N=100000
Frequency of U values
Values
0
2000
4000
6000
8000
10000
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

d)


Scatter plot for N=1000
U_(i+1)
U_i
0.0
0.2
0.4
0.6
0.8
1.0


Scatter plot for N=10000
U_(i+1)
U_i
0.0
0.2
0.4
0.6
0.8
1.0

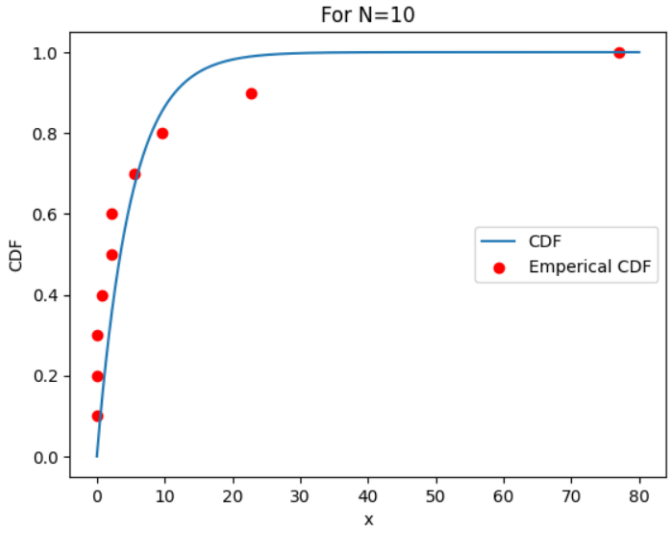


Observations:

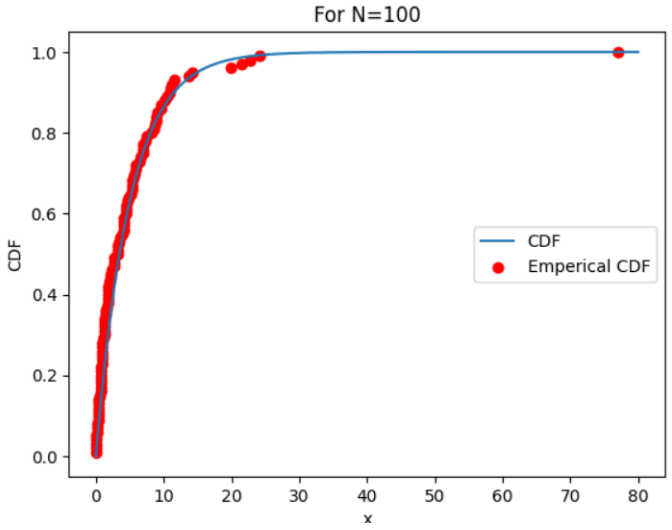
1.As N value increases,the generated values are getting uniformly distributed over the given range

2.Unlike the linear congruence generator, the U_{i+1} vs U_i graph is spread over the entire region

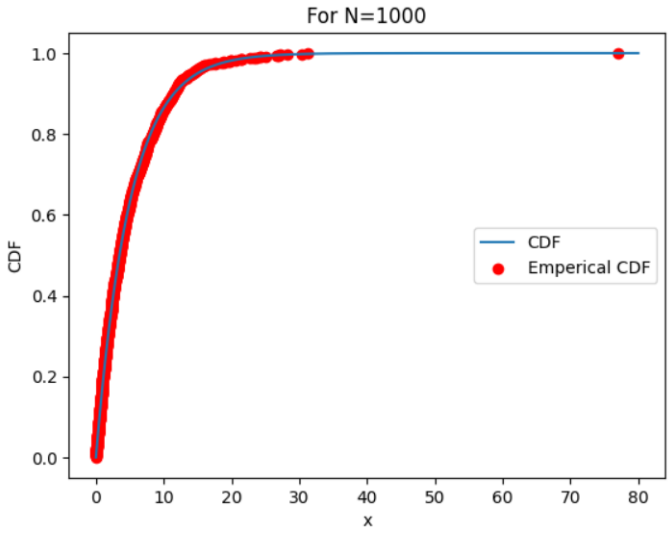
Question 2



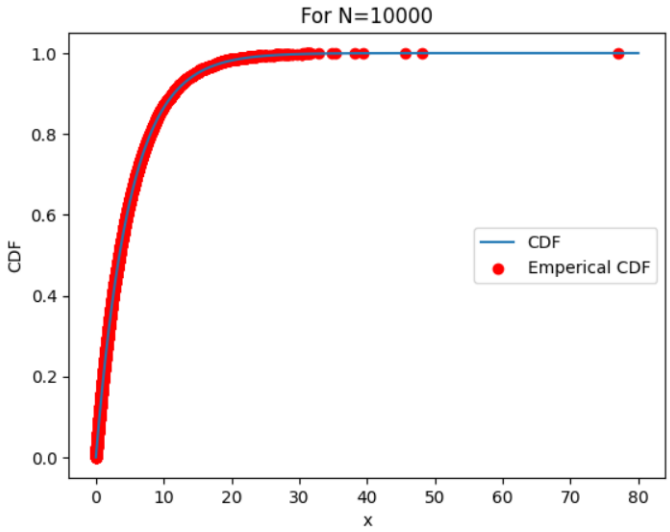
mean:12.023
variance:513.709



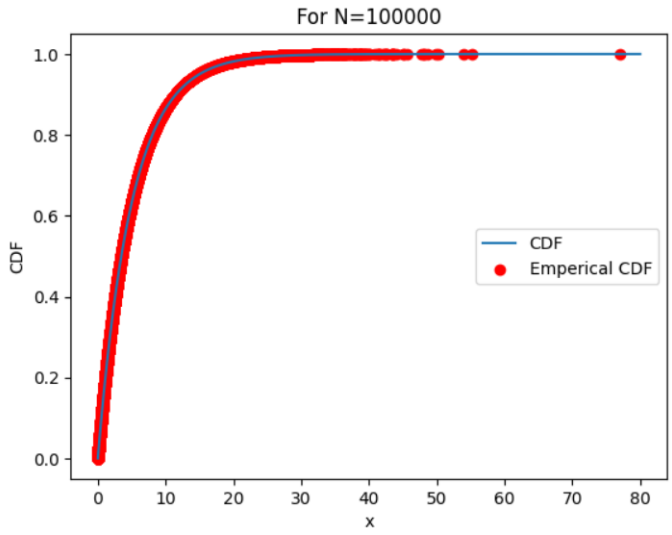
mean:5.357
variance:76.800



mean:5.051
variance:28.904



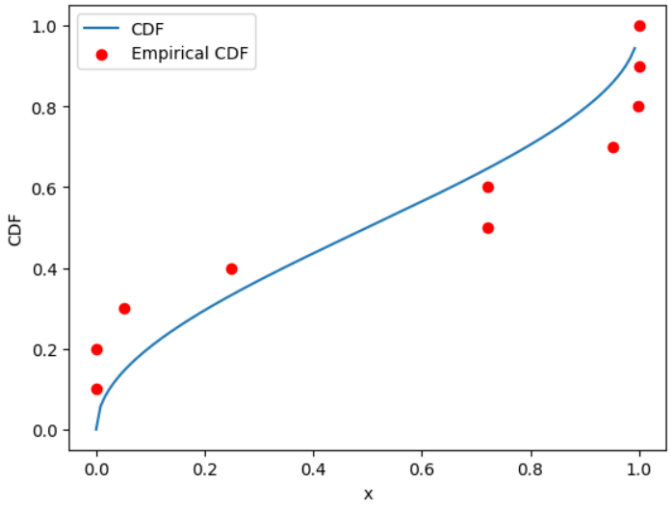
mean:4.934
variance:24.299



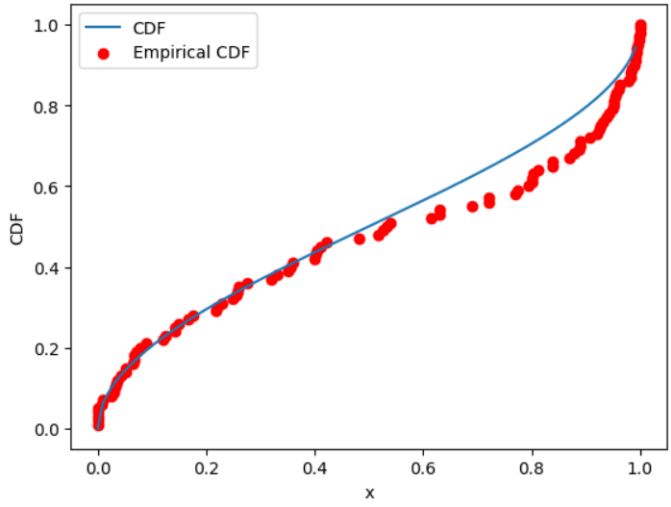
mean:5.003
variance:24.956

Observations:
We have taken θ=5 and we see that as N increases,the mean approaches θ and variance approaches θ^2=25 in accordance with the exponential distribution.

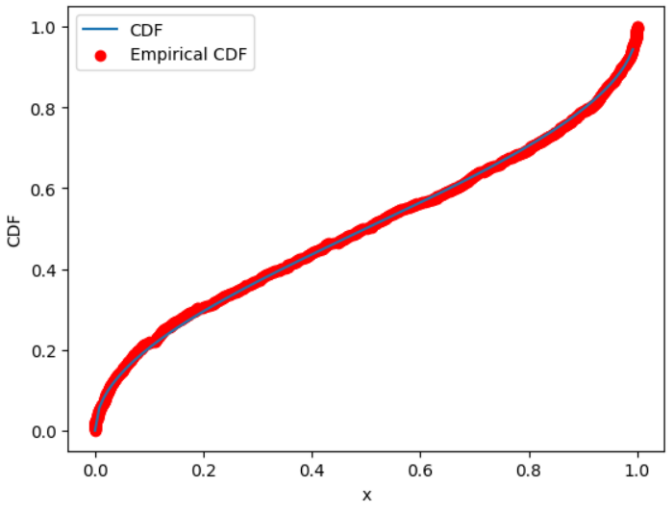
Question 3



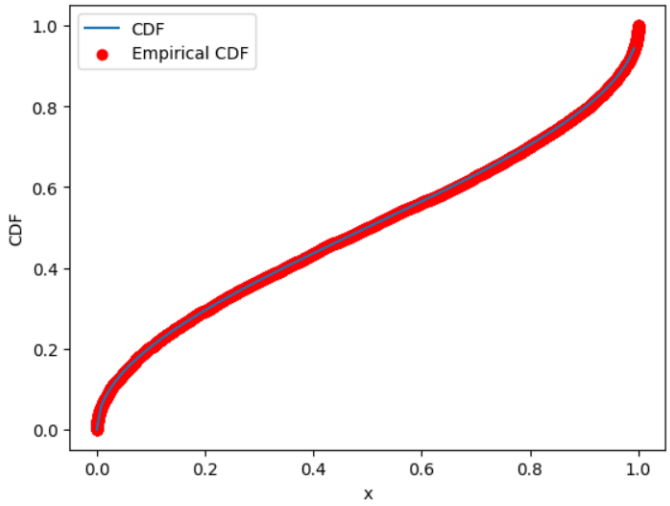
mean:0.569
variance:0.176



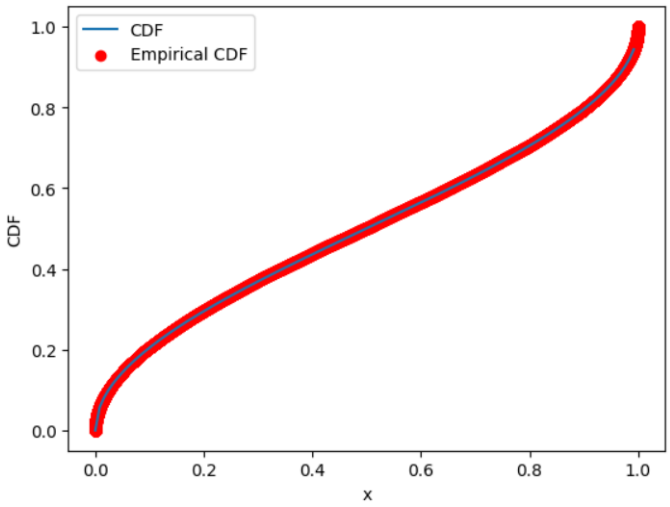
mean:0.538
variance:0.140



mean:0.499
variance:0.127



mean:0.503
variance:0.125



mean:0.499
variance:0.125

Observations:
We see that as N increases,the mean approaches 0.5 and variance approaches 0.125 in accordance with the Arcsin law Distribution.

Question 4

Range	frequency
1-999	9973
1001-1999	10087
2001-2999	10028
3001-3999	10043
4001-4999	9942
5001-5999	10029
6001-6999	9917
7001-7999	9971
8001-8999	9992
9001-9999	10018

Observations:
Using the algorithm given in class notes, N=5000 c_k=2k-1
$q_k = \frac{k}{N}$
and as $q_{k-1} < U_k \leq q_k$
$k = \lceil Nu \rceil$
$c = 2\lceil Nu \rceil - 1$