MA 323 (2020) Monte Carlo Simulation: LAB 12
Jay Vikas Sabale
180123019

Problem I:

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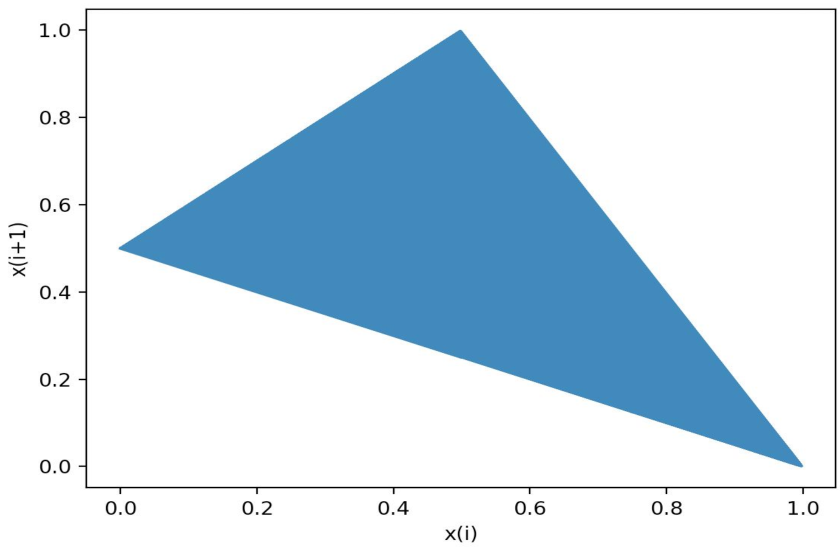
[The first 25 values of the Van der Corput sequence are:
      N   Van der Corput(N)
0     0            0.00000
1     1            0.50000
2     2            0.25000
3     3            0.75000
4     4            0.12500
5     5            0.62500
6     6            0.37500
7     7            0.87500
8     8            0.06250
9     9            0.56250
10   10            0.31250
11   11            0.81250
12   12            0.18750
13   13            0.68750
14   14            0.43750
15   15            0.93750
16   16            0.03125
17   17            0.53125
18   18            0.28125
19   19            0.78125
20   20            0.15625
21   21            0.65625
22   22            0.40625
23   23            0.90625
24   24            0.09375
```

1000 Values of Van der Corput Sequence using radical inverse function, plotted as $(x_i,\ x_{i+1})$:



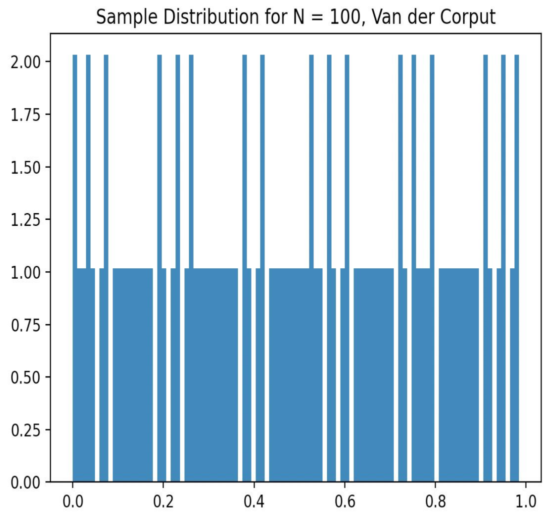
<u>Observations:</u>

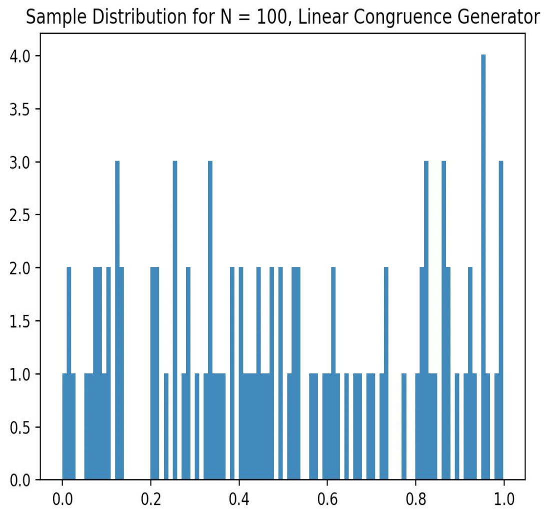
1. The above graph shows that, x(i) and x(i+1) are wee distributed in the interval [0, 1]. They acquire a **triangular shape** which is suggestive of a **sufficient variation** in consecutive values.

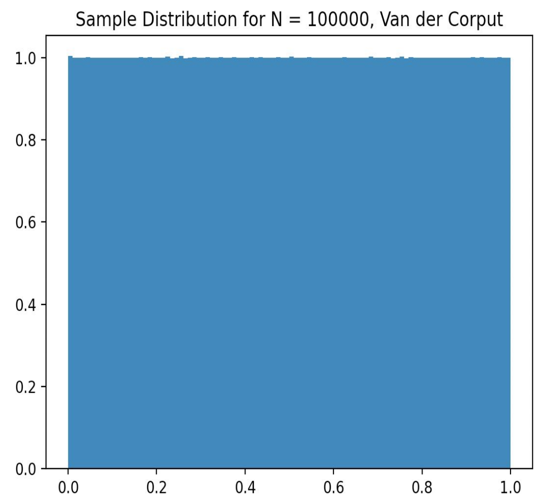
Comparison between the sampled distributions of 100 and 1,00,000 values generated by Van der Corput and Linear Congruence Generator.

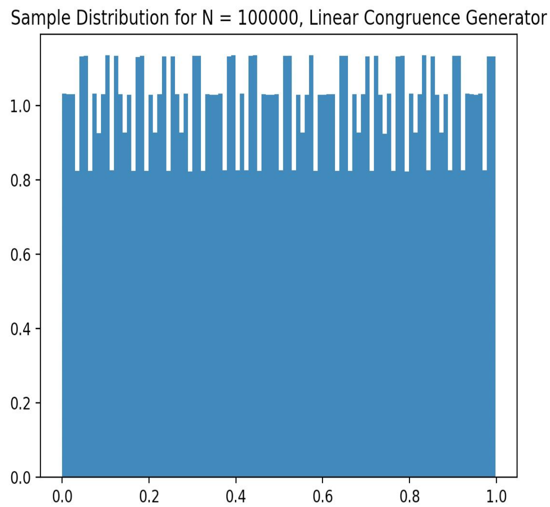
Linear Congruence Generator Used:

1. a = 51749
2. b = 1352
3. m = 244944
4. x_0 = 3

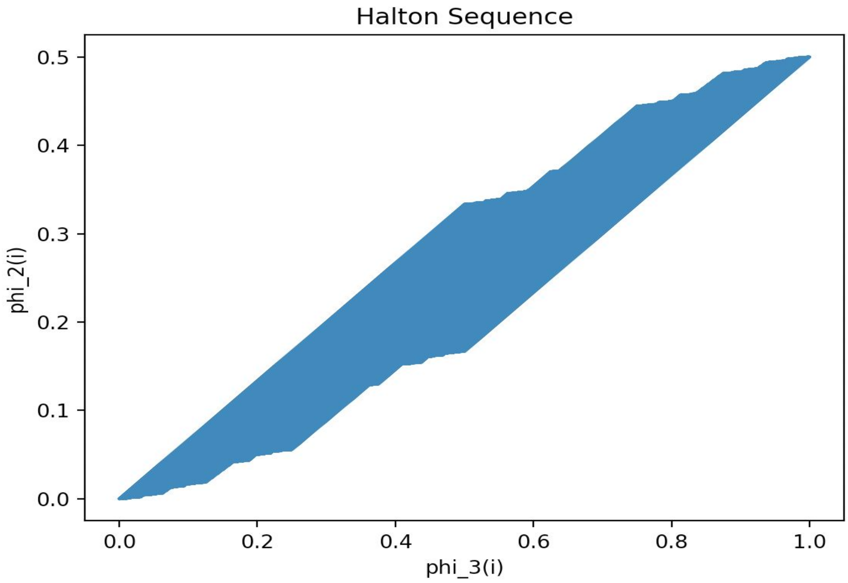




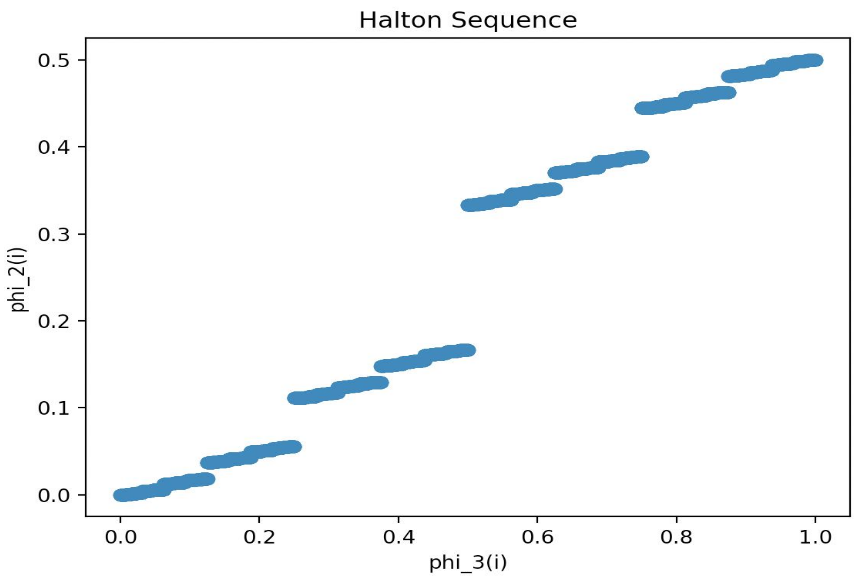




Problem II:



(Halton Sequence Actual)



(Halton Sequence Scattered)

Observations:

1. From the above graphs, we can observe that the absolute difference in the values of phi_2(i) and phi_3(i) increases with increasing i. With phi_3(i) being greater than phi_2(i) for sufficiently large i.