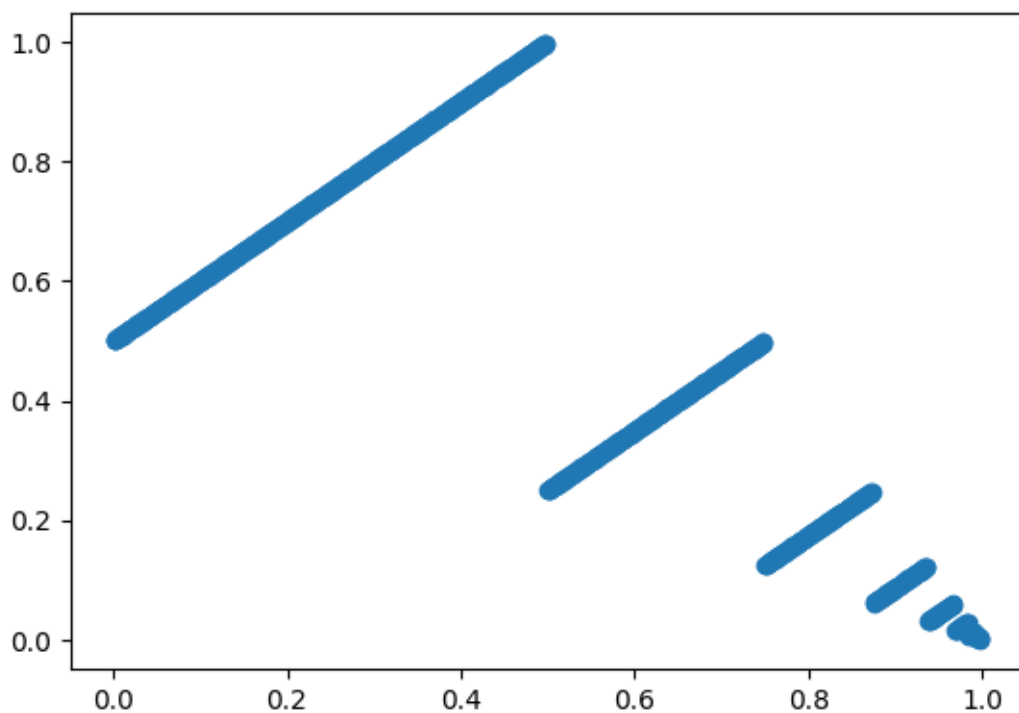


Lab 10
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Submission deadline:1 November,2023

1)First 25 values:

[0.5, 0.25, 0.75, 0.125, 0.625, 0.375, 0.875, 0.0625, 0.5625, 0.3125, 0.8125, 0.1875, 0.6875, 0.4375, 0.9375, 0.03125, 0.53125, 0.28125, 0.78125, 0.15625, 0.65625, 0.40625, 0.90625, 0.09375, 0.59375]

(x_i, x_{i+1}) plot for first 1000 values:



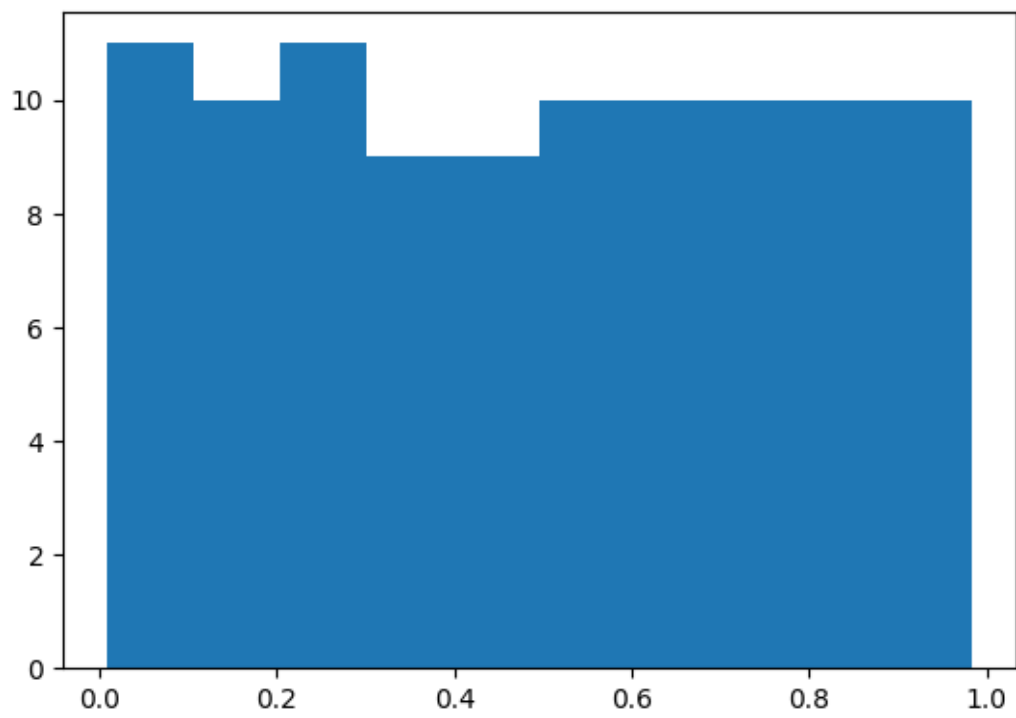
Observations:

- a)The interval $[0,1]$ is covered almost uniformly by x_i .
- b) x_{i+1} and x_i are correlated.

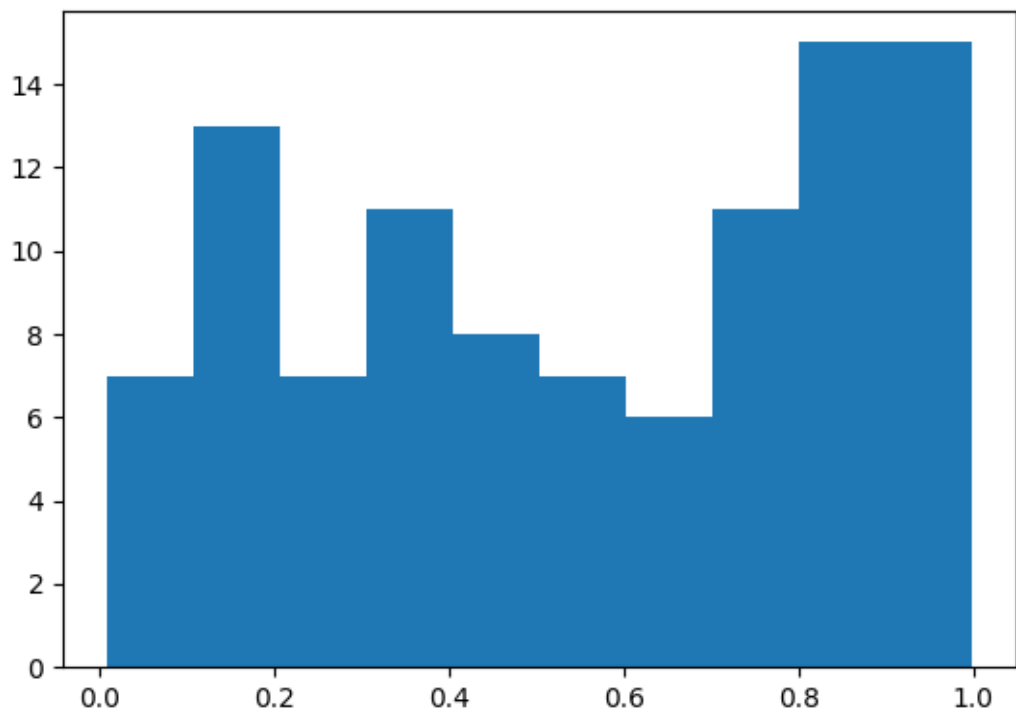
2)

For $N=100$:

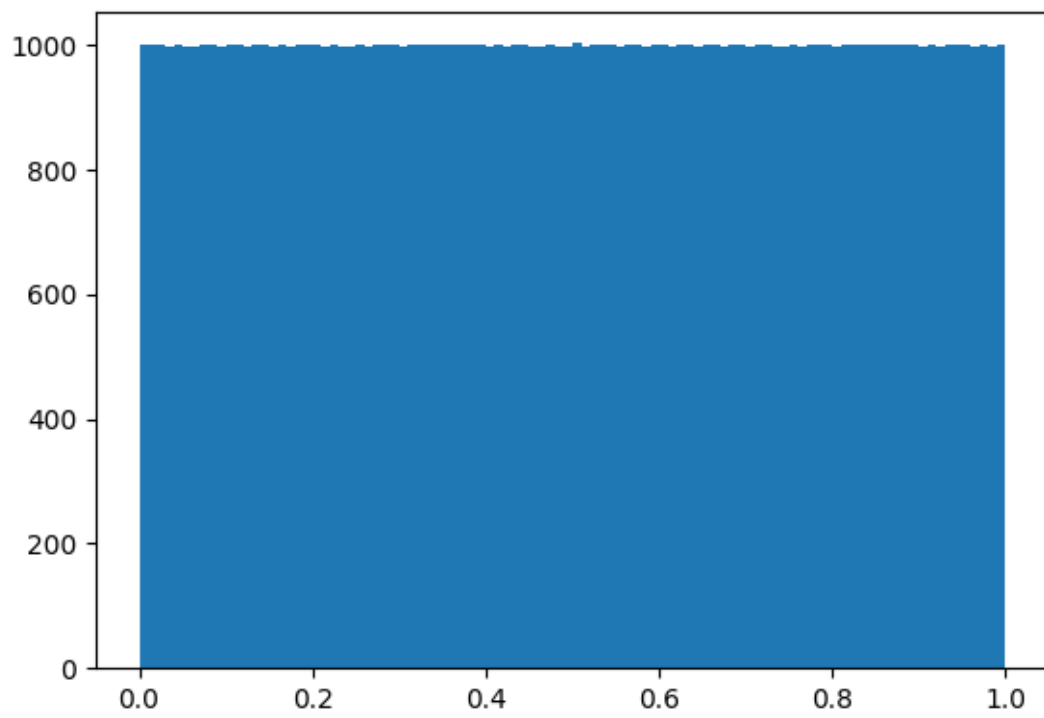
Van der Corput:



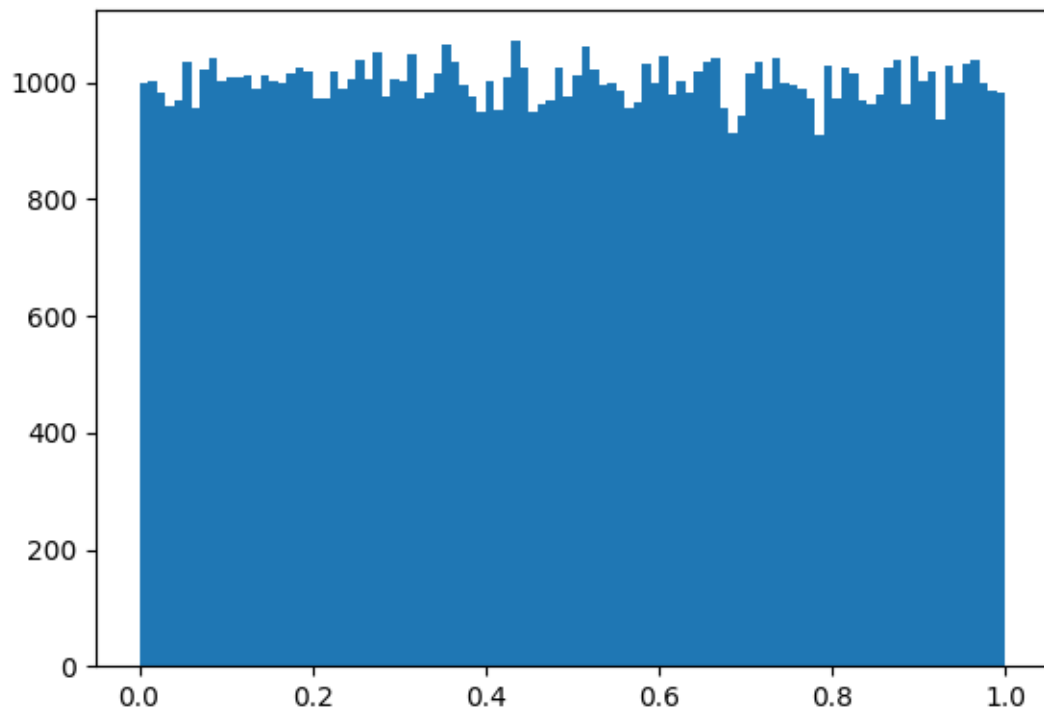
LCG:



N=100000:
Van der Corput:



LCG:



LCG used is :

$a=51749$

$b=0$

$m=244944584$

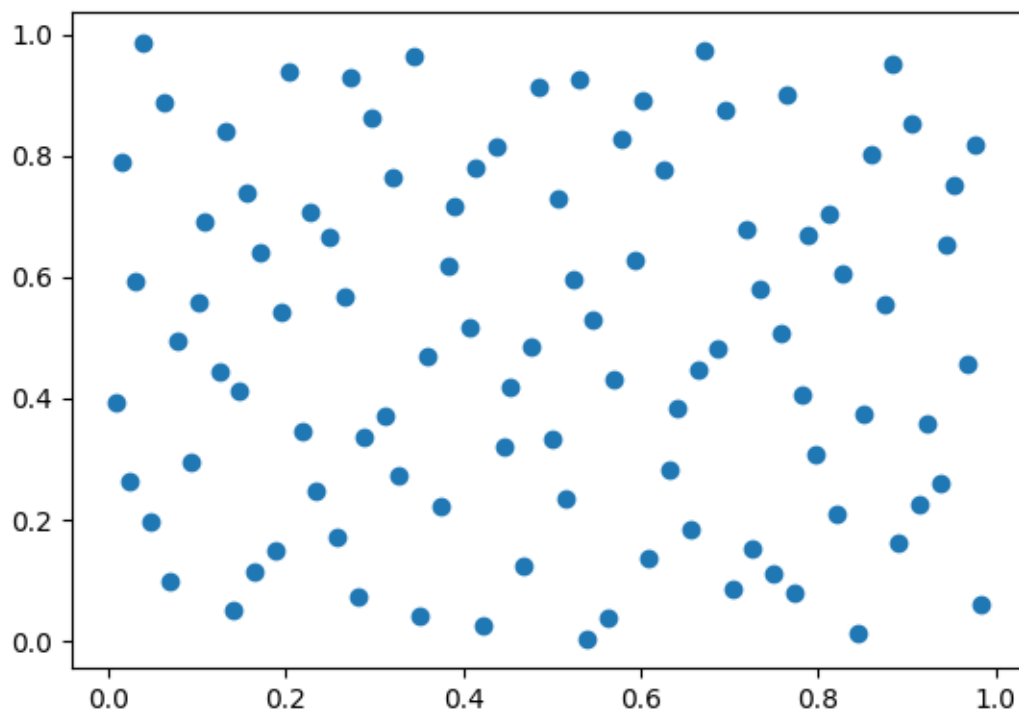
$x_0=50$

and $x_{i+1} = (a * x_i + b) \% m$

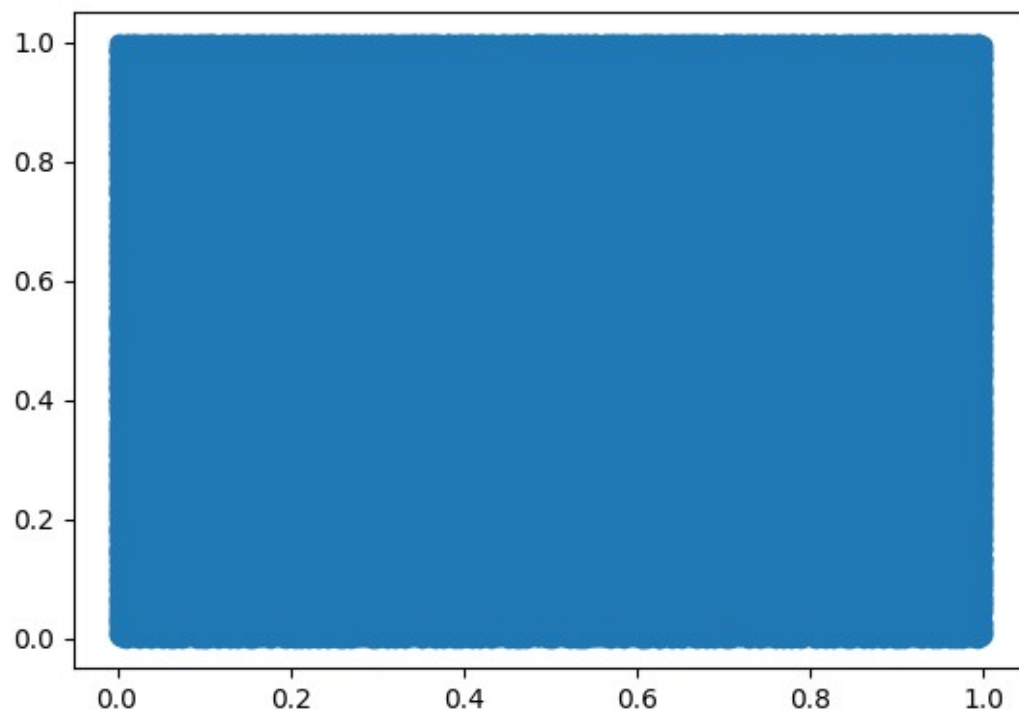
The van der corput sequence values are more uniformly distributed in the interval as indicated by the frequencies in each bin

3)

For $N=100$:



For $N=100000$:



As N value increases, as 2 and 3 are prime, the $(\phi_2(i), \phi_3(i))$ are even more uniformly distributed across $[0,1] \times [0,1]$. Even for small N , the values have not left any gaps in the region.