MA323 Lab10 Report

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Q1)

Using Van Der Corput Algorithm, the sequence would be

$$x_i := \phi_b(i).$$

Where,

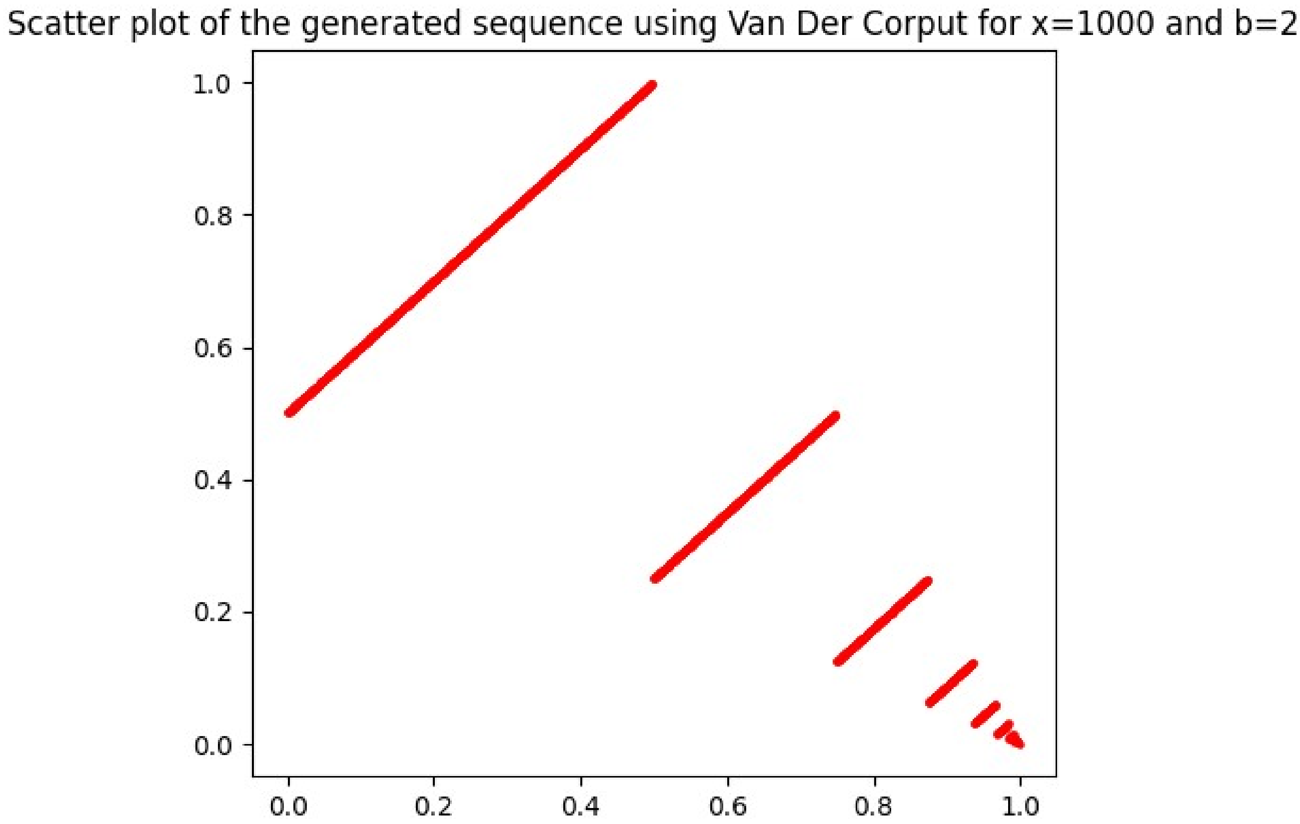
$$\phi_b(i) := \sum_{k=0}^{\infty} d_k b^{-k-1} = \sum_{k=0}^{\infty} \frac{d_k}{b^{k+1}}.$$

where i is given by:

$$i = \sum_{k=0}^{\infty} d_k b^k,$$

The sequence generated:

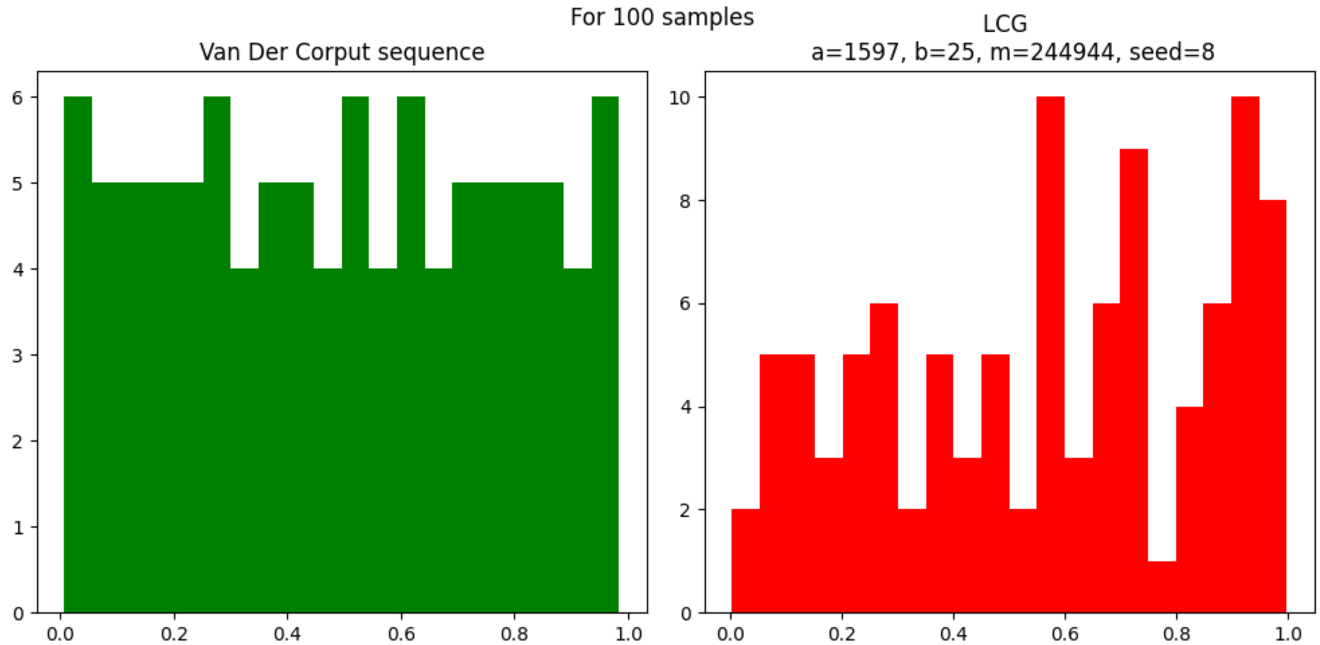
[0, 0.5, 0.25, 0.75, 0.125, 0.625, 0.375, 0.875, 0.0625, 0.5625, 0.3125, 0.8125, 0.1875, 0.6875, 0.4375, 0.9375, 0.03125, 0.53125, 0.28125, 0.78125, 0.15625, 0.65625, 0.40625, 0.90625, 0.09375, 0.59375]

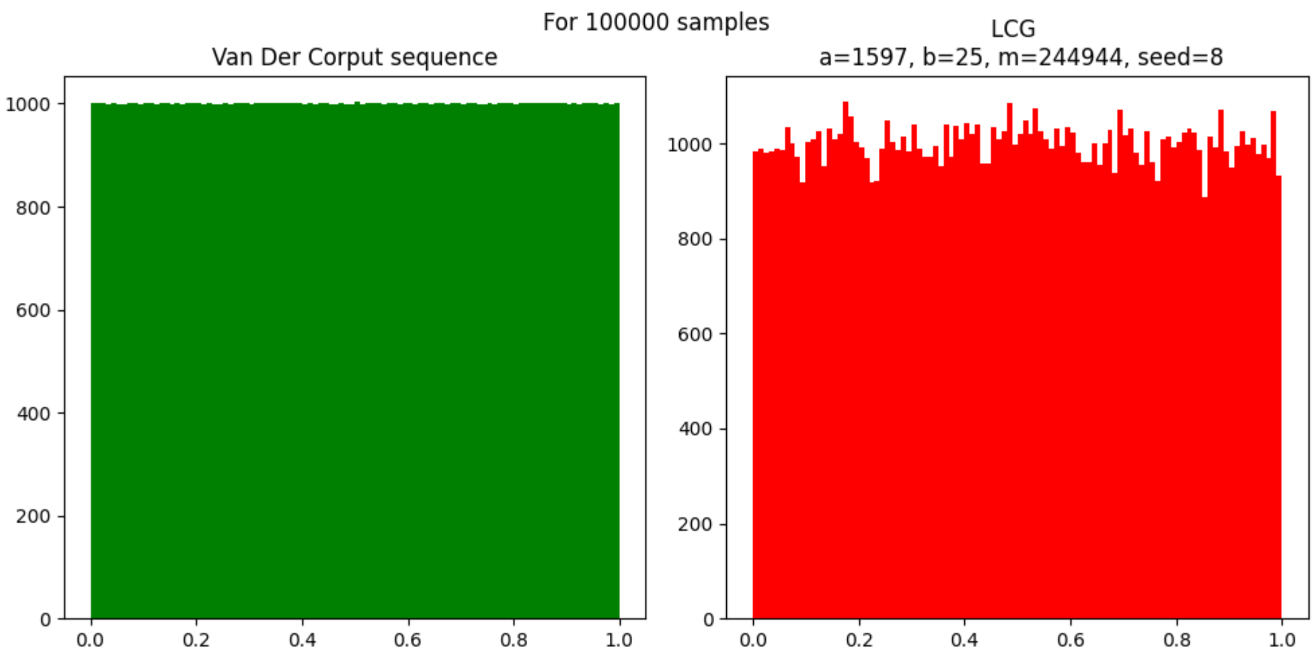


Observations:

- The points form a set of lines parallel to y=x, thus the points are not uniformly distributed.
- Since the Van Der Corput sequence is deterministic, the values generated do not follow pseudo-random properties.

Q2)

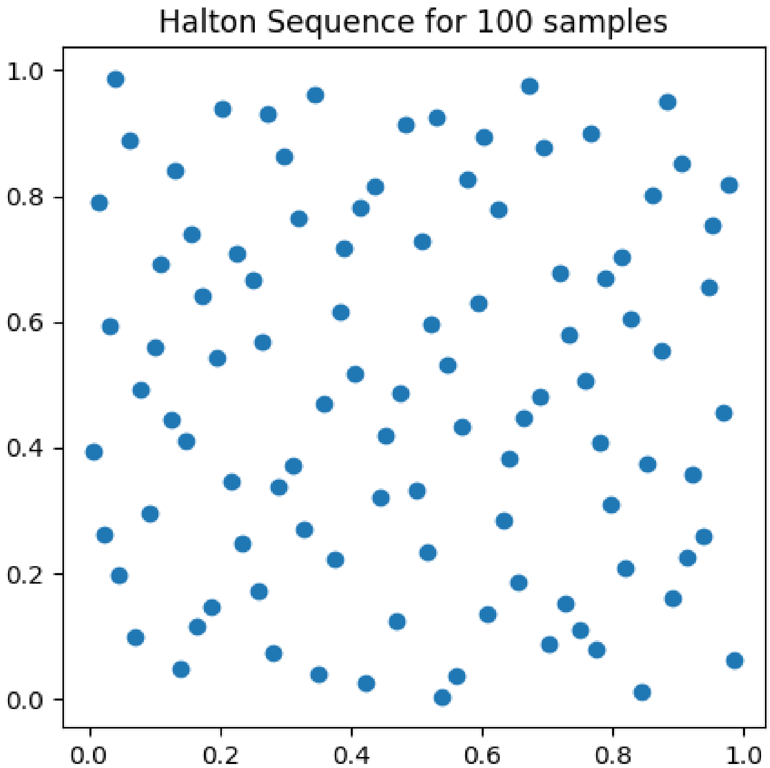


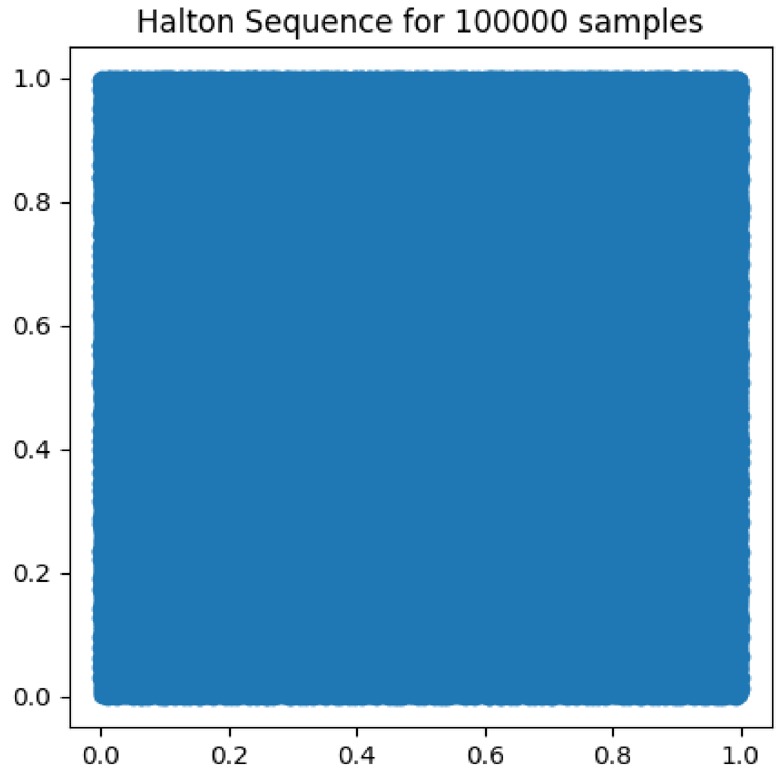


Observations:

- The sequence generated using Van Der Corput is more uniformly distributed than LCG.
- The proportion of points in an interval is proportional to the size of the interval.

Q3)





Observations:
We can see that the values generated are very evenly distributed with no observable gaps in R^2 even thought they are not random, I.e, they are deterministic.