# Assignment 9

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Question 1

First 25 values of the Van der Corput sequence using the radical inverse function are –
[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]

Plot of overlapping pairs (X_i, X_{i+1}) for first 1000 numbers from Van der Corput sequence.
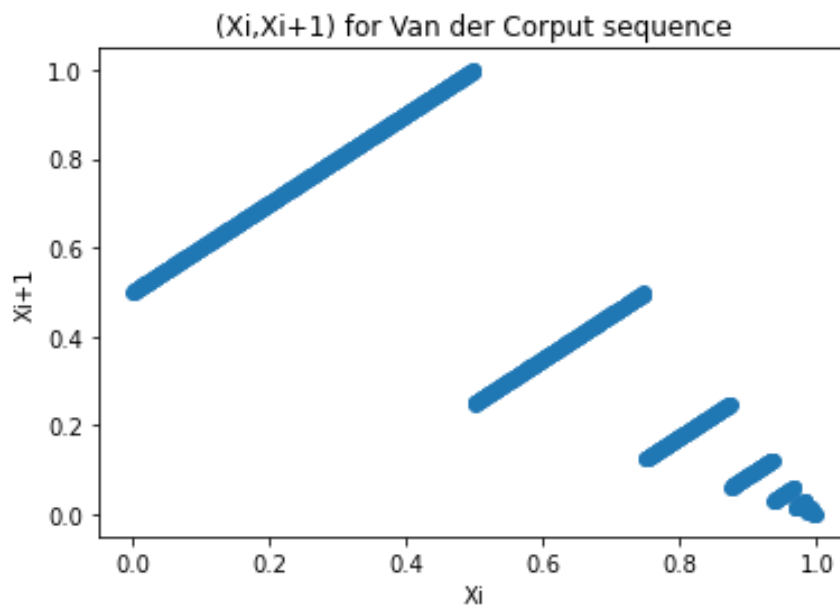
X_{i+1} is mostly linearly dependent on X_i with few breakpoints.

Question 2
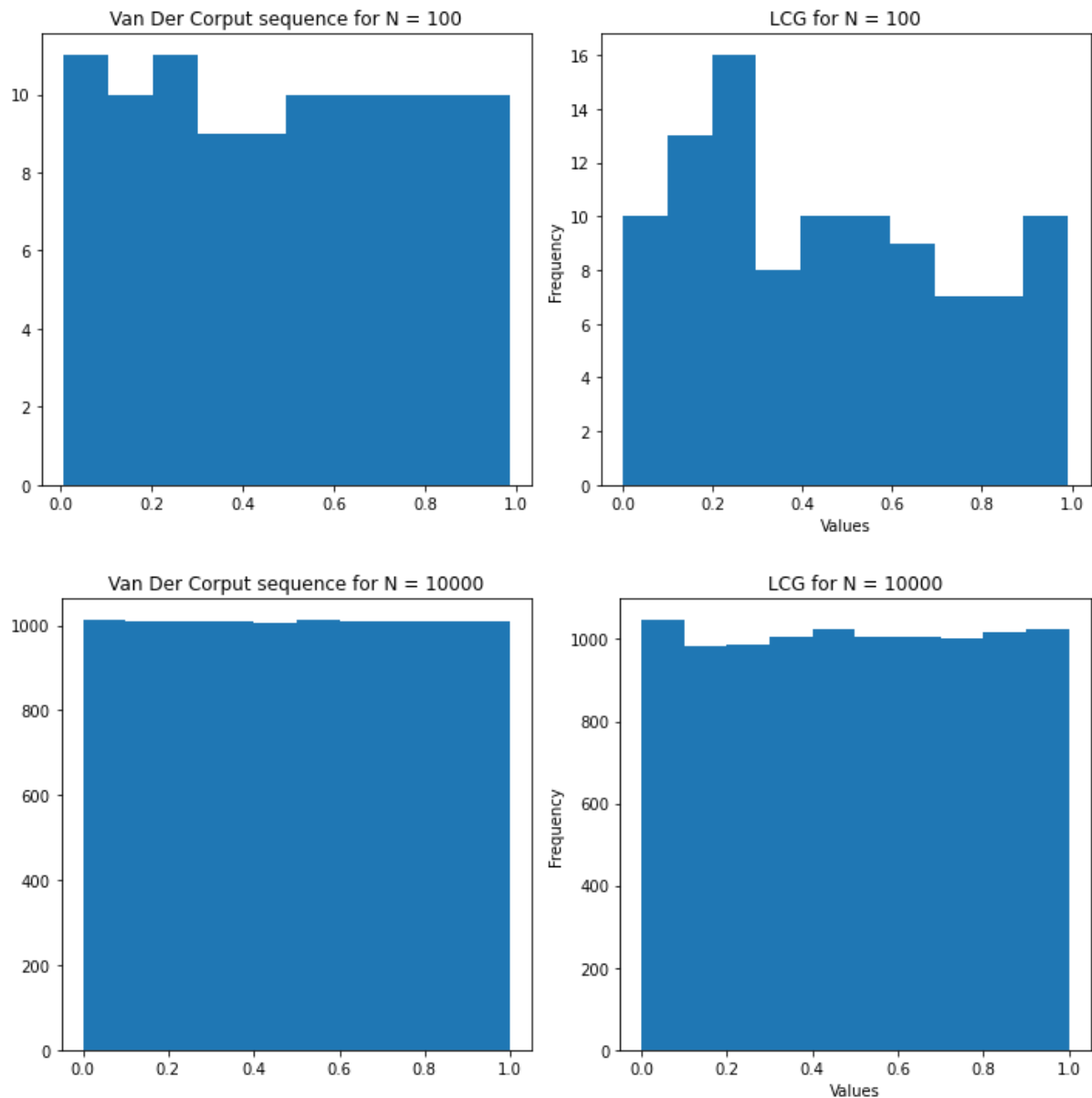
Both for N = 100 and N = 100000, Van der Corput have generated numbers that are more uniformly distributed as compared to LCG.

I have used the following formula for generating from LCG -
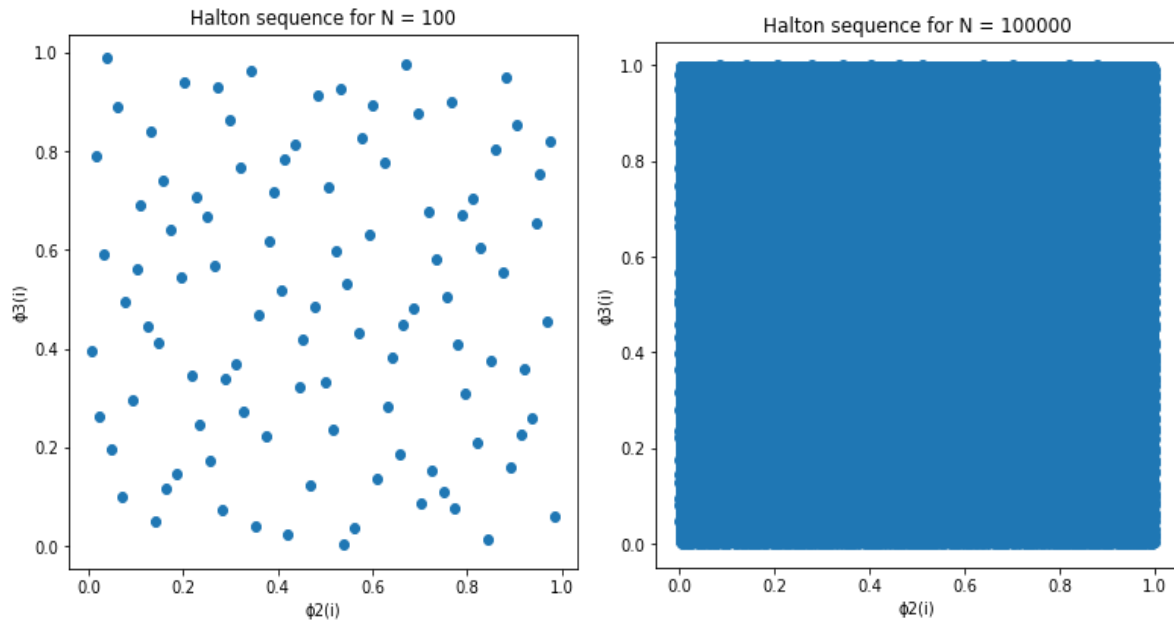
$X_{i+1} = (a*X_i + c) \% m$

$U_{i+1} = X_{i+1}/m$

where I have taken a = 2057, c = 1345, m = 2^{50}, and X_0 = 3245

Question 3

Generated and plotted first 100 and 100000 values from the Halton sequence $X_i = (\phi_2(i), \phi_3(i))$.

where $\phi_b(i) = \sum_{k=0}^{\infty} d_k b^{-k-1}$

In both the cases points are uniformly distributed in $[0,1]^2$.