Monte Carlo Simulations (MA323) Lab 12

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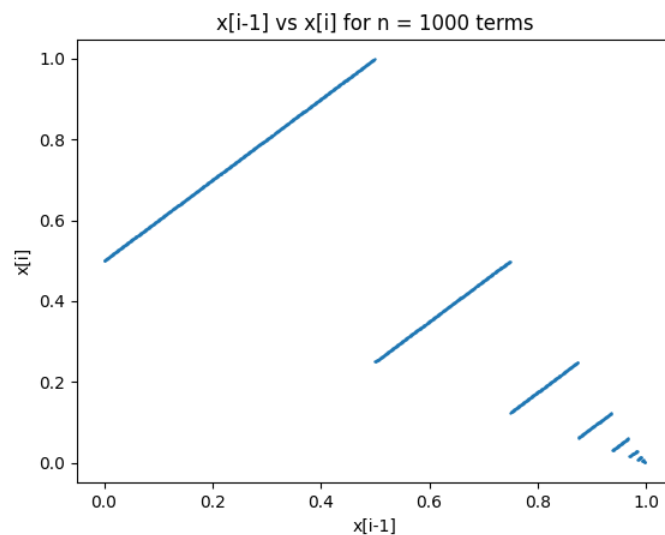
Roll no - 180123021

Run the code using - python3 180123021.py

The first 25 terms of the Van der Corput sequence $\phi_2(i)$ are -

[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]

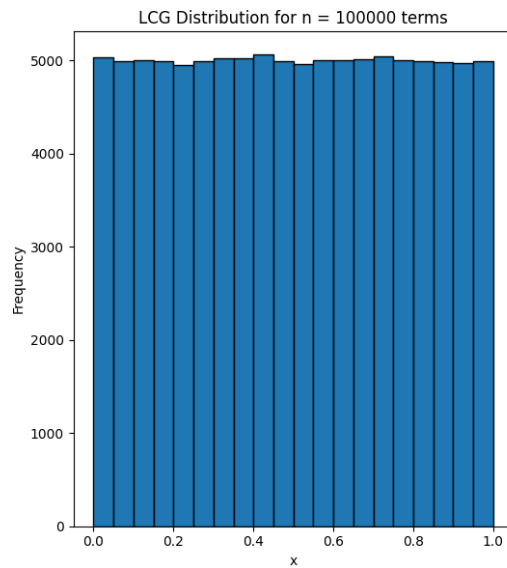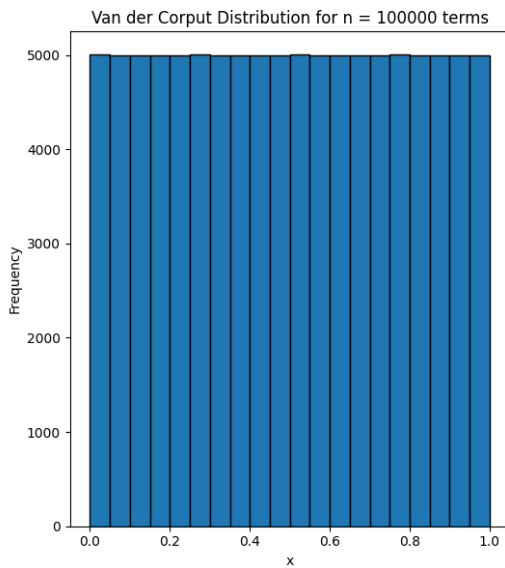Now first 1000 terms of the sequence are generated and a scattered plot is made. The plot is -
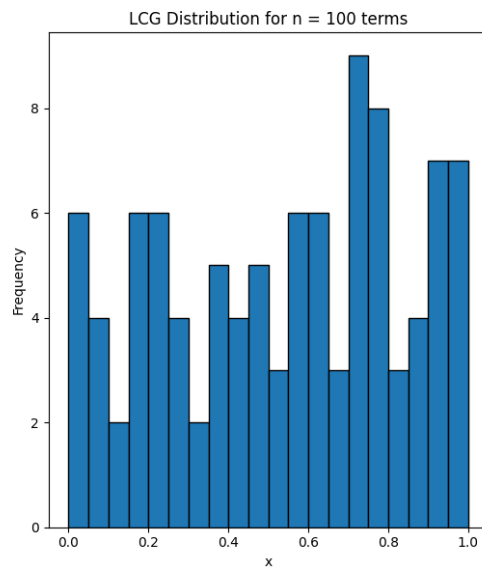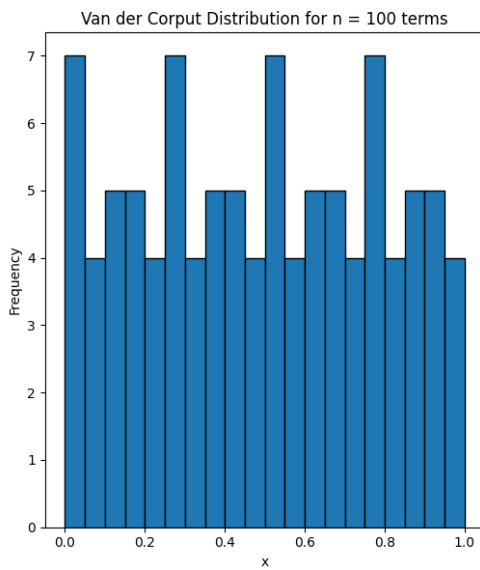
Then, first 100 and 100000 terms of the Van der Corput sequence $\phi_2(i)$ are generated and the same number of terms are generated using a Linear Congruence Generator with the parameters -

$$a = 1229, b = 9, m = 2048, x_0 = 417 \text{ for 100 terms}$$
$$a = 12205, b = 9, m = 65536, x_0 = 5357 \text{ for 100000 terms}$$

The distributions were then plotted side-by-side. The distributions are -

Then, the first 100 and 100000 terms of the Halton sequence $(\phi_2(i), \phi_3(i))$ are generated and plotted as points in $\mathbb{R}^2$. The plots are as follows -