STATS202A - HW 1

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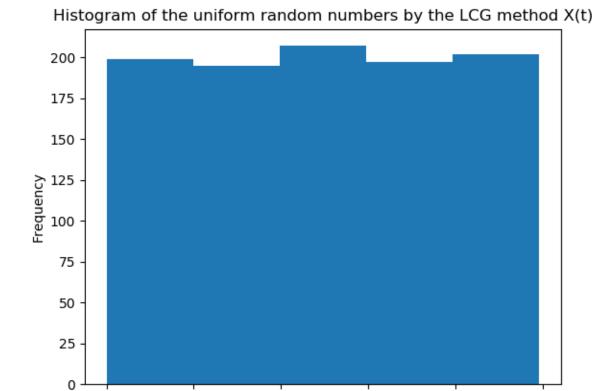
0.0

0.2

Python -

2.a) The uniform random numbers were generated with the parameters:

Seed (X0) = 0, a(multiplier) = 5, b(adder) = 3, m = 128, N(number of samples) = 1000



Below is the scatter plot of X(t) vs X(t+1). We can see that values are uniformly covered in the interval [0,1].

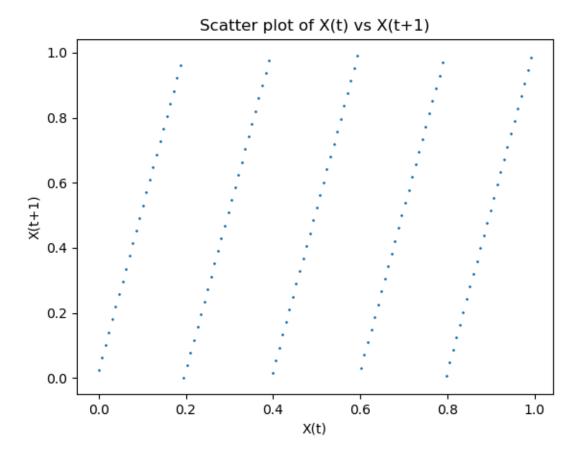
Uniform random numbers [0-1]

0.6

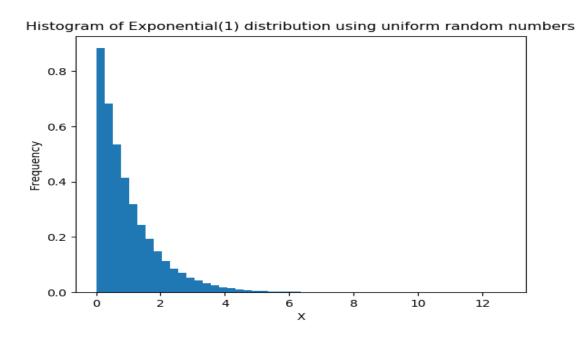
0.8

1.0

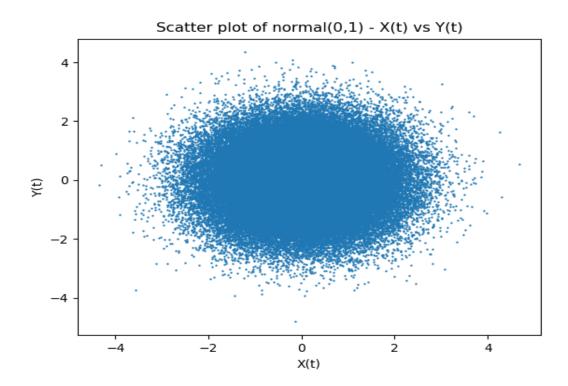
0.4



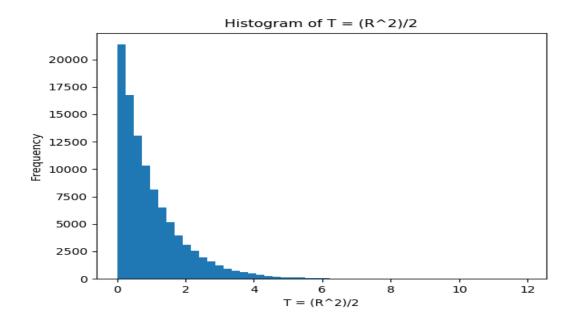
2. b) Histogram of the exponential distribution where lambda = 1 using uniform random numbers generated.



2. c) Scatter plot of N(0,1) on the X and Y axes built using uniform random numbers generated.



Histogram of $T = R^2/2$ where this follows a exponential distribution.



3) Below are the results obtained for Monte Carlo computation:

```
Estimated value of pi = 3.14496

Estimated volume of 5 dimensional unit ball is 5.32256

Estimated volume of 10 dimensional unit ball is 2.58048

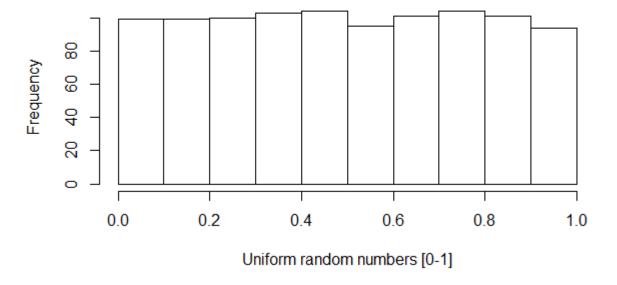
>>> | Ln:151 Col:4
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R -

2.a) The uniform random numbers were generated with the parameters:

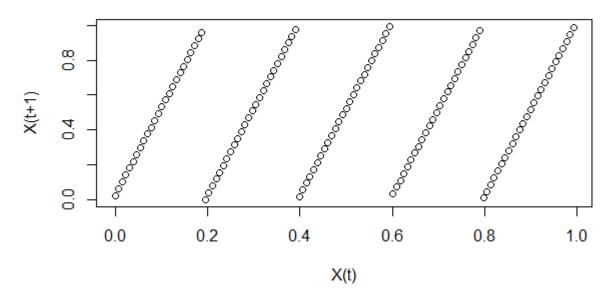
Seed (X0) = 0, a(multiplier) = 5, b(adder) = 3, m = 128, N(number of samples) = 1000

Histogram of uniform random numbers by LCG method X(t)



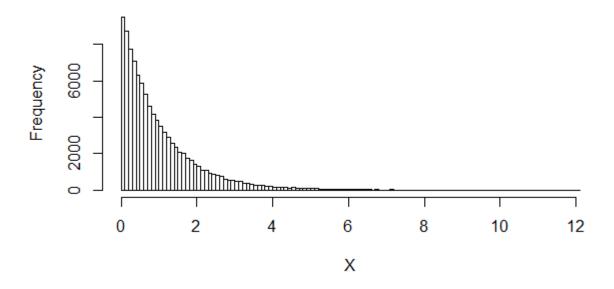
Below is the scatter plot of X(t) vs X(t+1). We can see that values are uniformly covered in the interval [0,1].

Scatter plot of X(t) vs X(t+1)



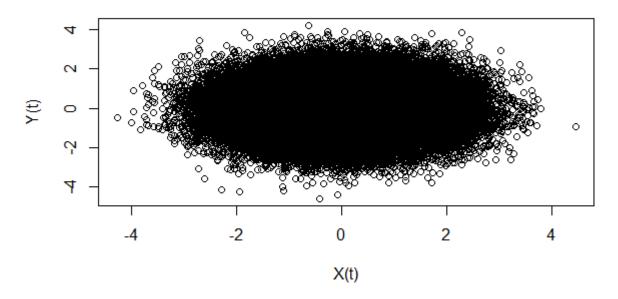
2. b) Histogram of the exponential distribution where lambda = 1 using uniform random numbers generated.

Histogram of Exponential(1) distribution



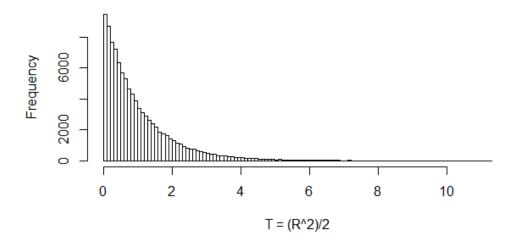
2. c) Scatter plot of N(0,1) on the X and Y axes built using uniform random numbers generated.

Scatter plot of normal(0,1) - X(t) vs Y(t)



Histogram of $T = R^2/2$ where this follows a exponential distribution.

Histogram of $T = R^2/2$



3) Below are the results obtained for Monte Carlo computation:

```
[1] "Estimated value of pi = 3.14376"
[1] "Estimated volume of 5 dimensional unit ball is 5.25504"
[1] "Estimated volume of 10 dimensional unit ball is 2.34496"
> |
```