

Assignment 2

Submitted by: Anirban Nath

Register number: 20242019

Question 1a. and 1b.

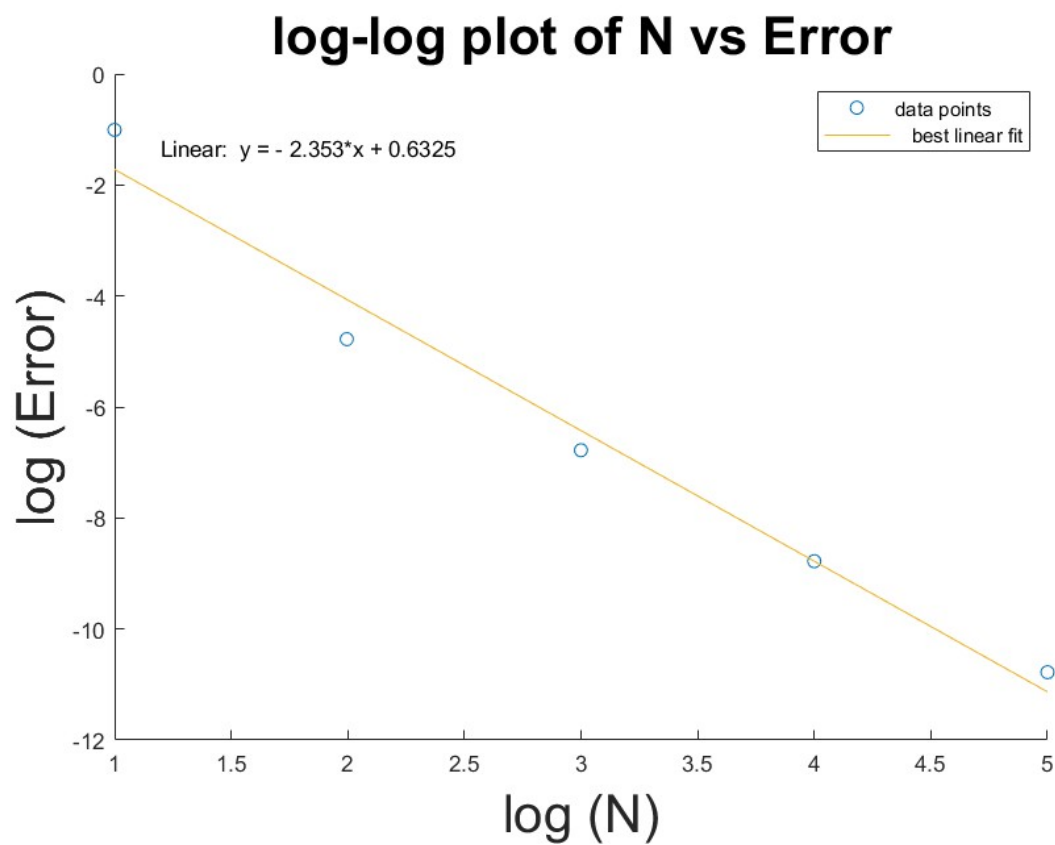
3.2399259889071588

3.1415759869231268

3.1415924869231224

3.1415926519231183

3.1415926535731558



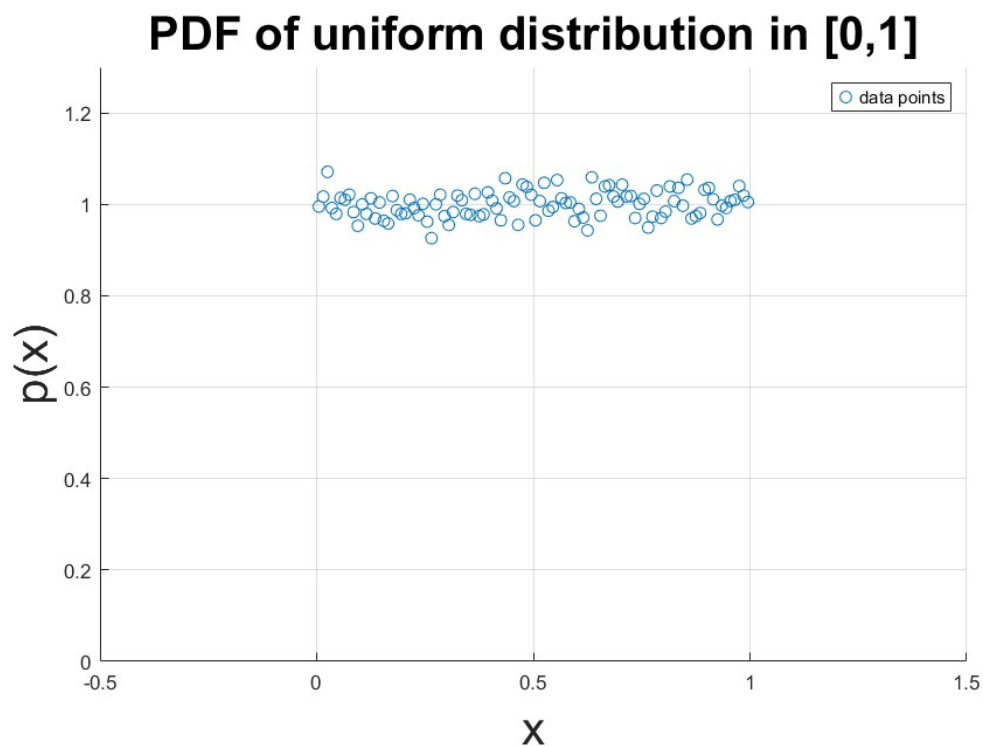
Question 1c.

1	1.4913616938342726	-	-3.3448228576294059
2	2.4969296480732148	-	-5.0012311549526611
3	3.4970679363985049	-	-7.3376293356428732
4	4.4971370640519579	-	-8.8773479194551648
5	5.4971495058611231	-	-11.162660640418334
6	6.4971497823417232	-	-13.307206800076383

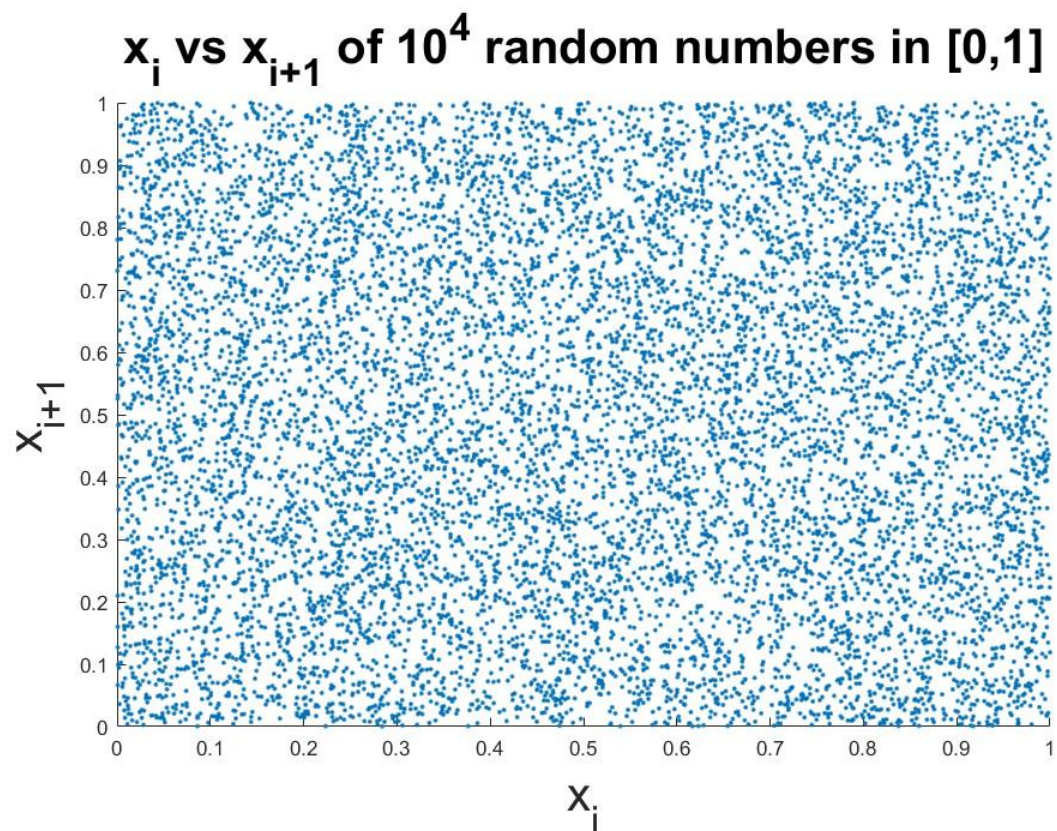
Question 1d.

1	1.7781512503836436	-	-3.6997105228091458
2	2.7774268223893115	-	-7.7531700167130548
3	3.7780788619374550	-	-6.6952492771401539
4	4.7781440120819596	-	-6.6905517215381822
5	5.7781505265589042	-	-6.6905049861256982
6	6.7781511780012238	-	-6.6905044527436983
7	7.7781512431454018	-	-6.6905049241814787

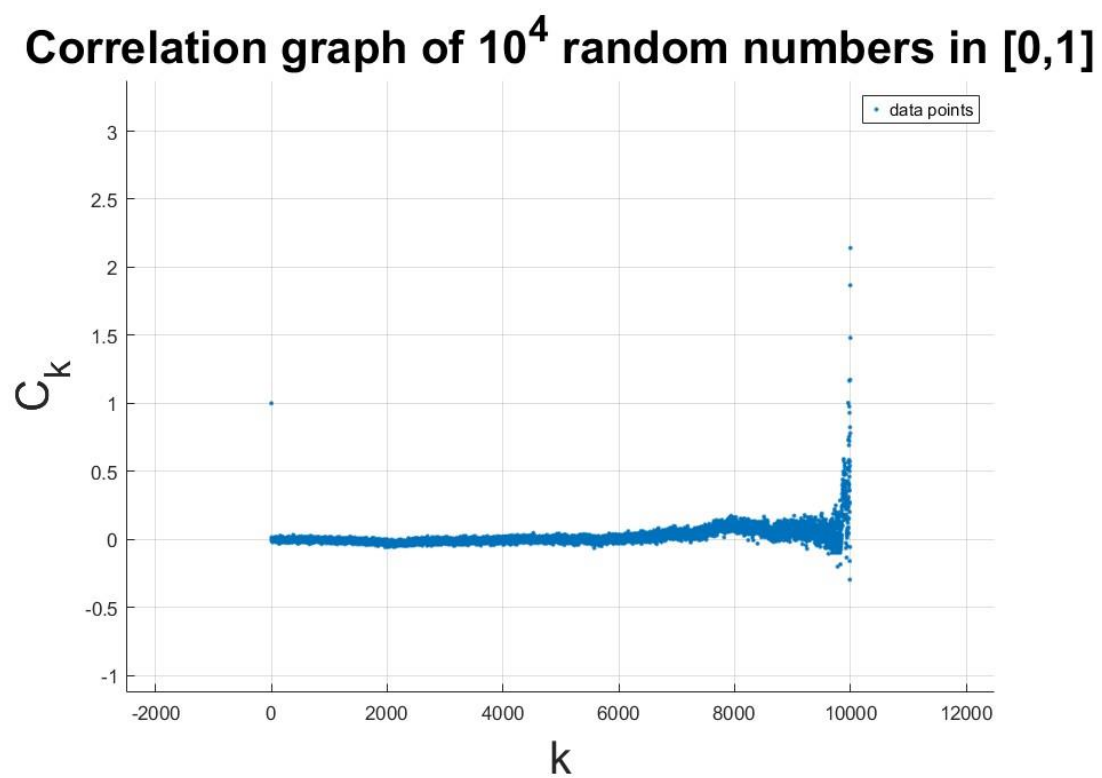
Question 2a.



Question 2b.



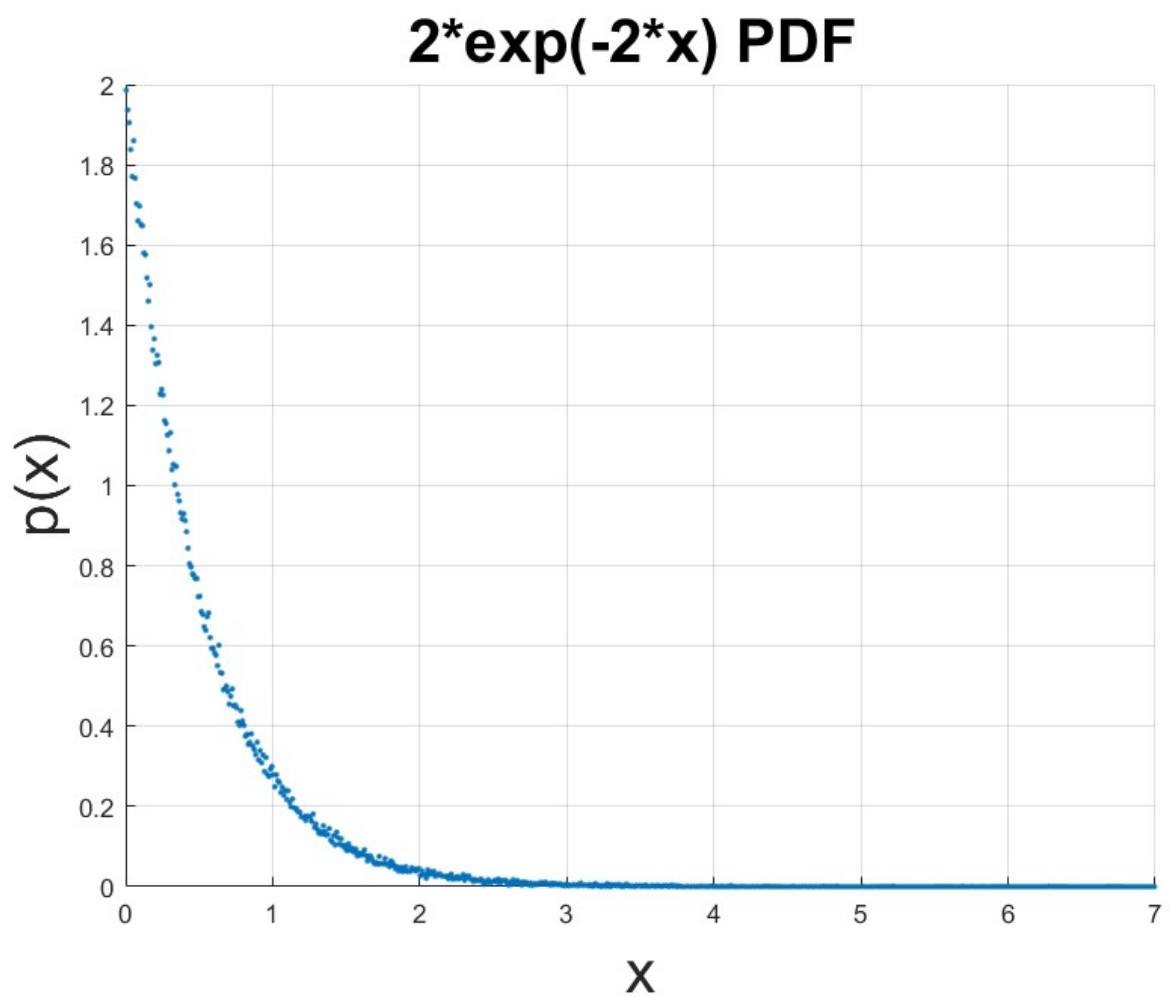
Question 2c.



Question 2d.

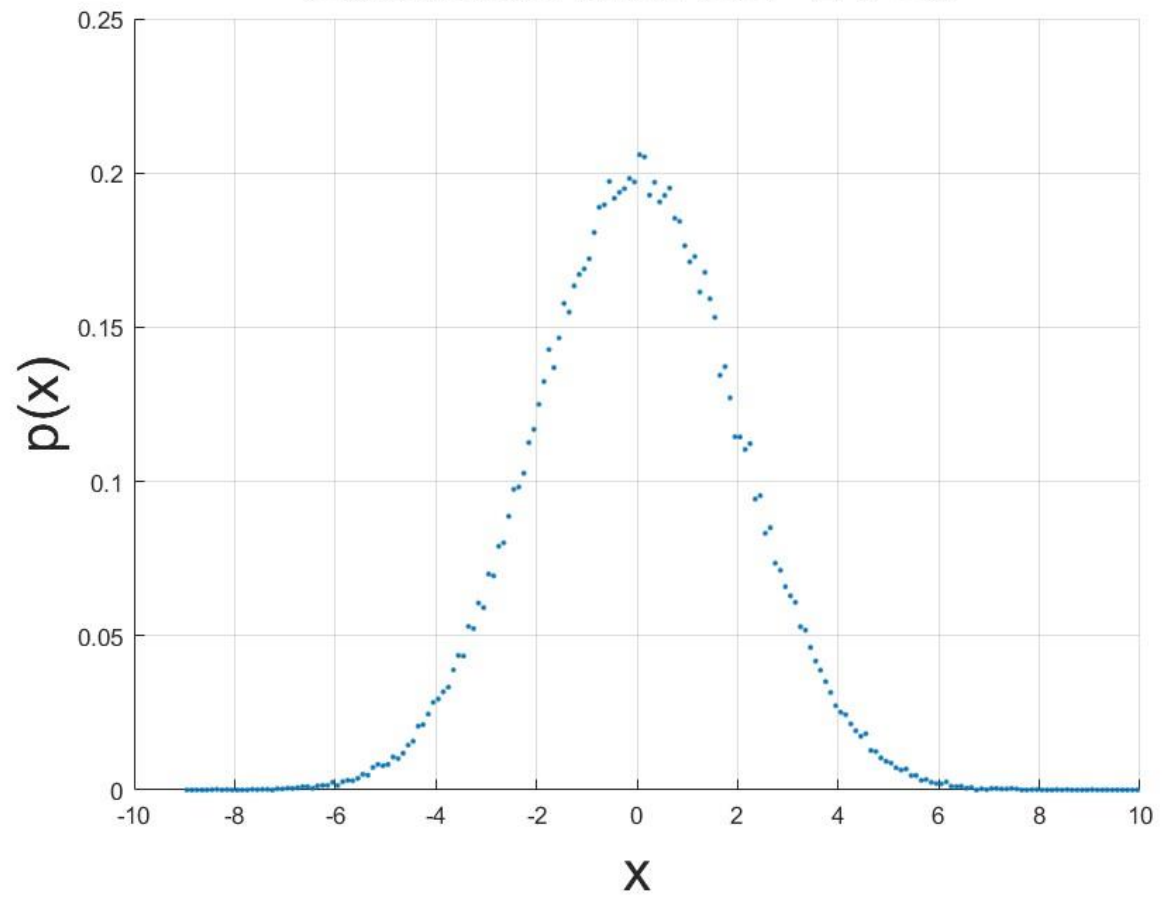
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The average of      10000 random numbers is    0.497747302
The standard deviation of      10000 random numbers is    0.289777160
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Question 4a.



Question 4b.

Gaussian with SD=2 PDF



Question 5a.

Brute force method with integral limits from -5 to 5

Integral with 10 samples is 5.7713264109594909E-010
Error is 8.8122712851541609E-025

Integral with 100 samples is 0.69265026422617859
Error is 3.7031050151537935E-006

Integral with 1000 samples is 18.547710244908558
Error is 1.0273260982331674E-002

Integral with 10000 samples is 20.286747700185085
Error is 2.0737080666417794E-002

Integral with 100000 samples is 11.269497752627199
Error is 1.8345079930994102E-003

Integral with 1000000 samples is 10.458549111402998
Error is 1.2178003150004806E-003

Integral with 10000000 samples is 10.804866013345558
Error is 3.9632497107684863E-004

Question 5b.

Importance sampling method

Integral with 10 samples is 10.473686834771485
Error is 0.84436303623763365

Integral with 100 samples is 11.087306200138594
Error is 0.17762690621997579

Integral with 1000 samples is 10.929032688562188
Error is 6.6365203681245696E-002

Integral with 10000 samples is 10.979177681597591
Error is 2.0893030653846116E-002

Integral with 100000 samples is 11.008323622488351
Error is 6.6288049766098523E-003

Integral with 1000000 samples is 10.964730633342146
Error is 2.0911549693493998E-003

Integral with 10000000 samples is 10.958893179488749
Error is 6.6104140497778169E-004