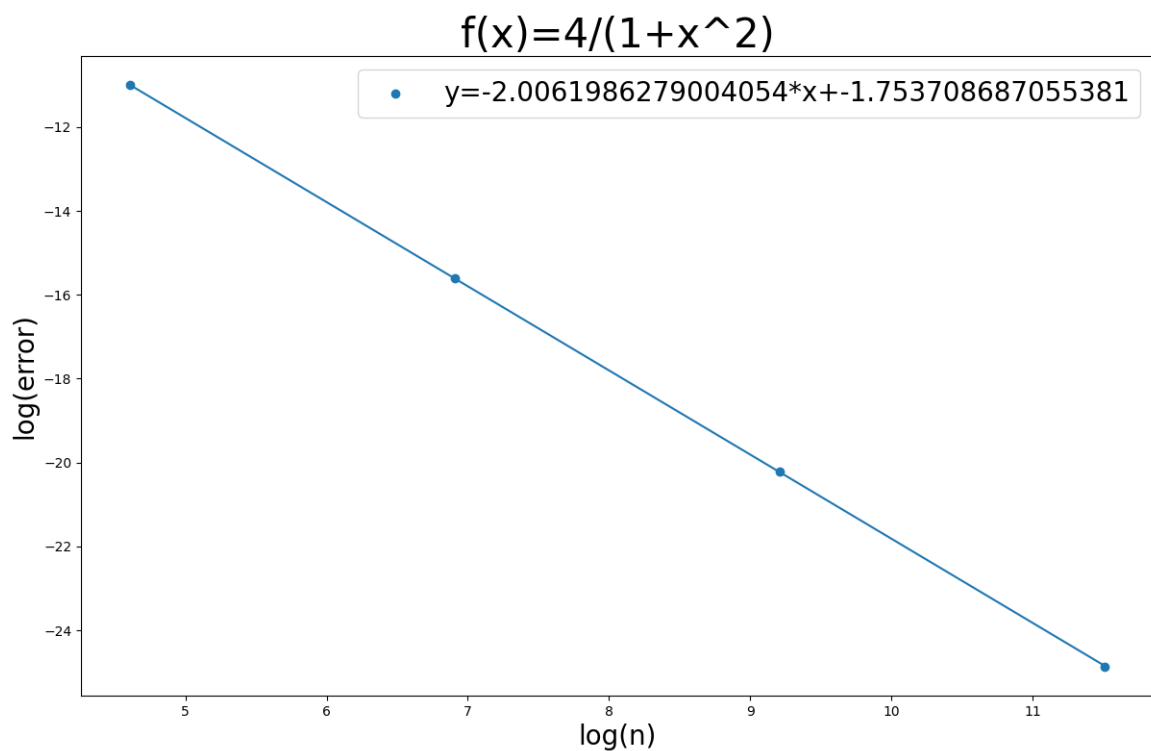


# Assignment-2

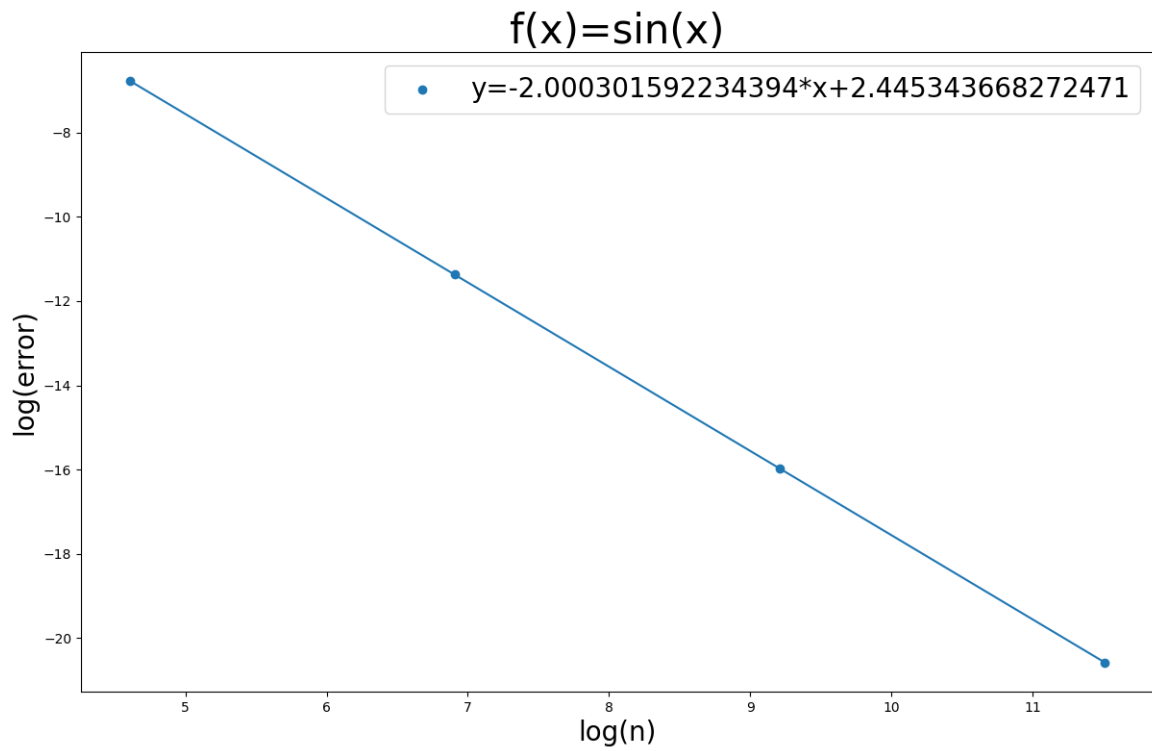
Bhambhu Jetharam Meharamram

## 1 Q1

```
jetharam@Jetharams-MacBook-Air Q1 % ./a.out
Trap_int of 1/(1+x^2) from 0 to 1
    100    3.1415759869231294    1.6666666663667229E-005
   1000    3.1415924869231242    1.6666666891040904E-007
  10000    3.1415926519232285    1.6665646640490195E-009
100000    3.1415926535739005    1.5892620552904191E-011
jetharam@Jetharams-MacBook-Air Q1 % █
```



```
jetharam@Jetharams-MacBook-Air Q1 % ./a.out
Trap_int of sin(x) from 0 to pi
    100    1.99983550387828449409594307836709493    1.64496121715505904056921632905069740E-0004
   1000    1.99999835506556720068358407005509799    1.64493443279931641592994490201371844E-0006
  10000    1.99999998355065456762286092390294339    1.64493454323771390760970566095000947E-0008
100000    1.9999999983550276279036215645110620    1.64497237209637843548893804963789642E-0010
jetharam@Jetharams-MacBook-Air Q1 % █
```



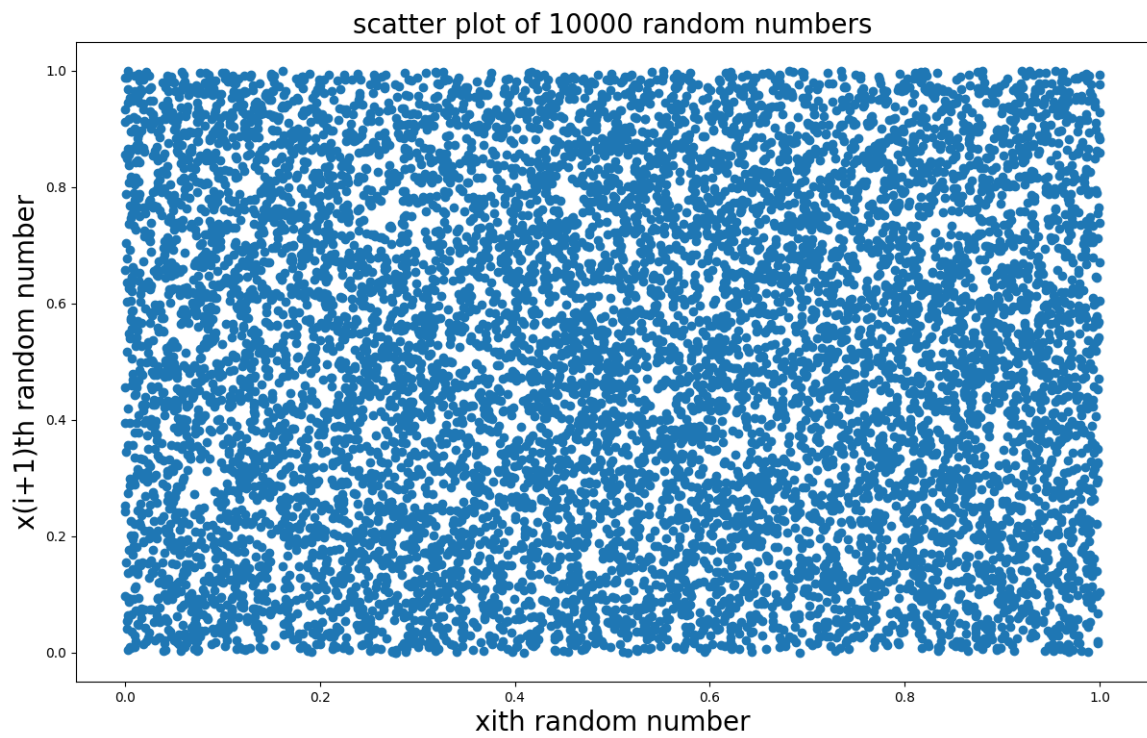
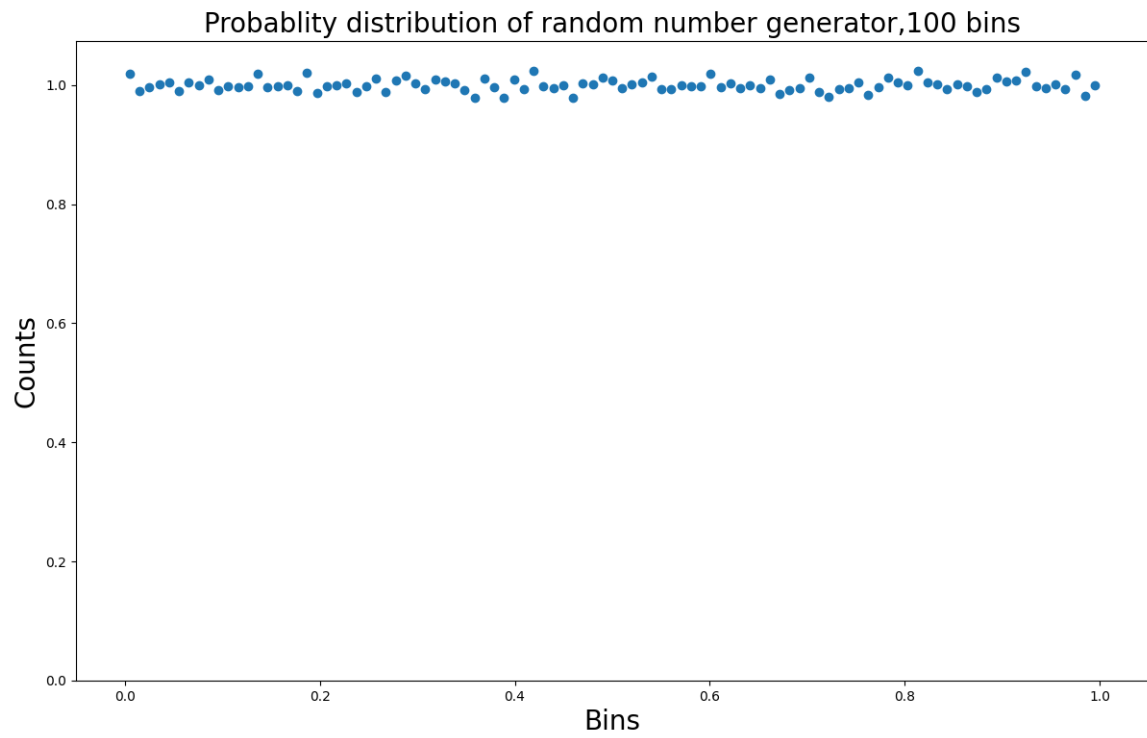
Q1 > trap\_norm.txt

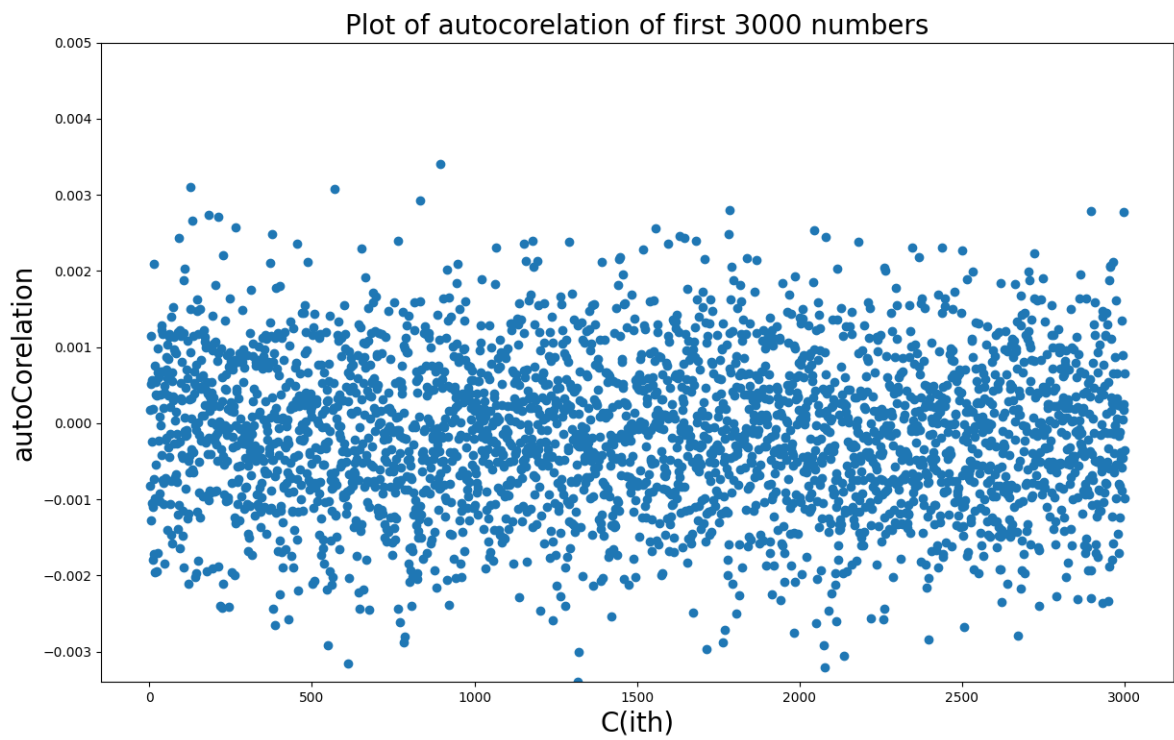
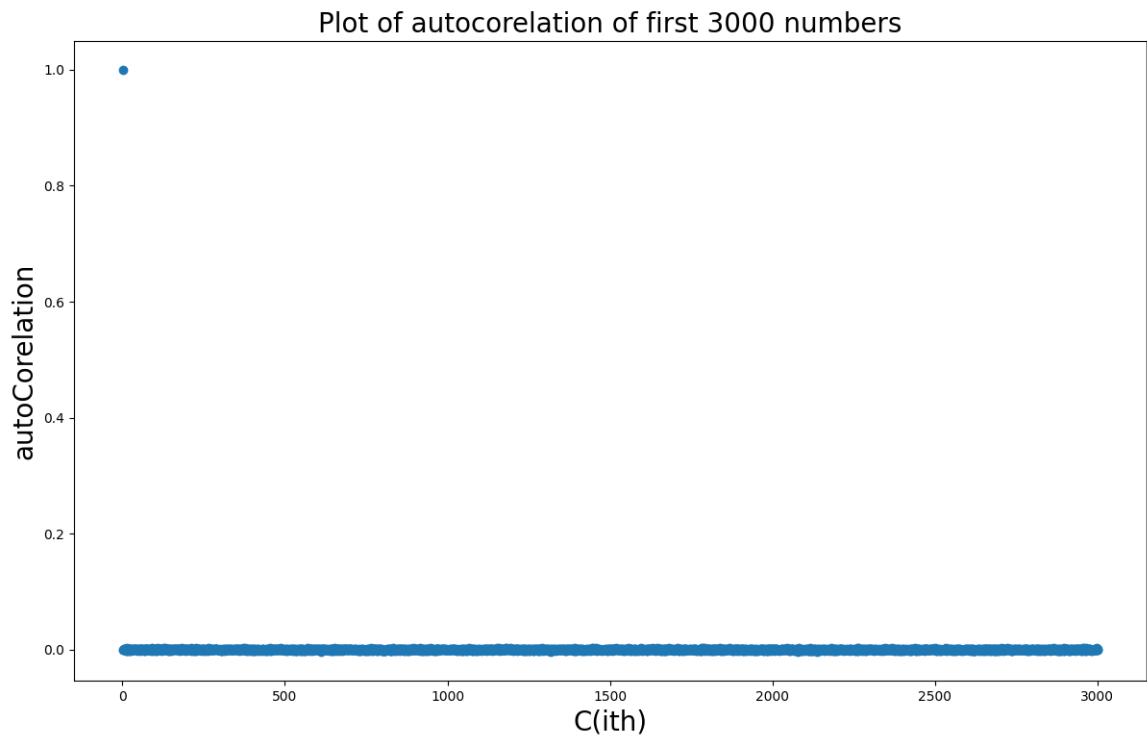
```

1 Integration of gaussian function from -1 to 1 with sigma=1
2 0.99755814038590596      100
3 0.99732671525422767     1000
4 0.99730286224806974    10000
5 0.99730046984015863    100000
6

```

## 2 Q2





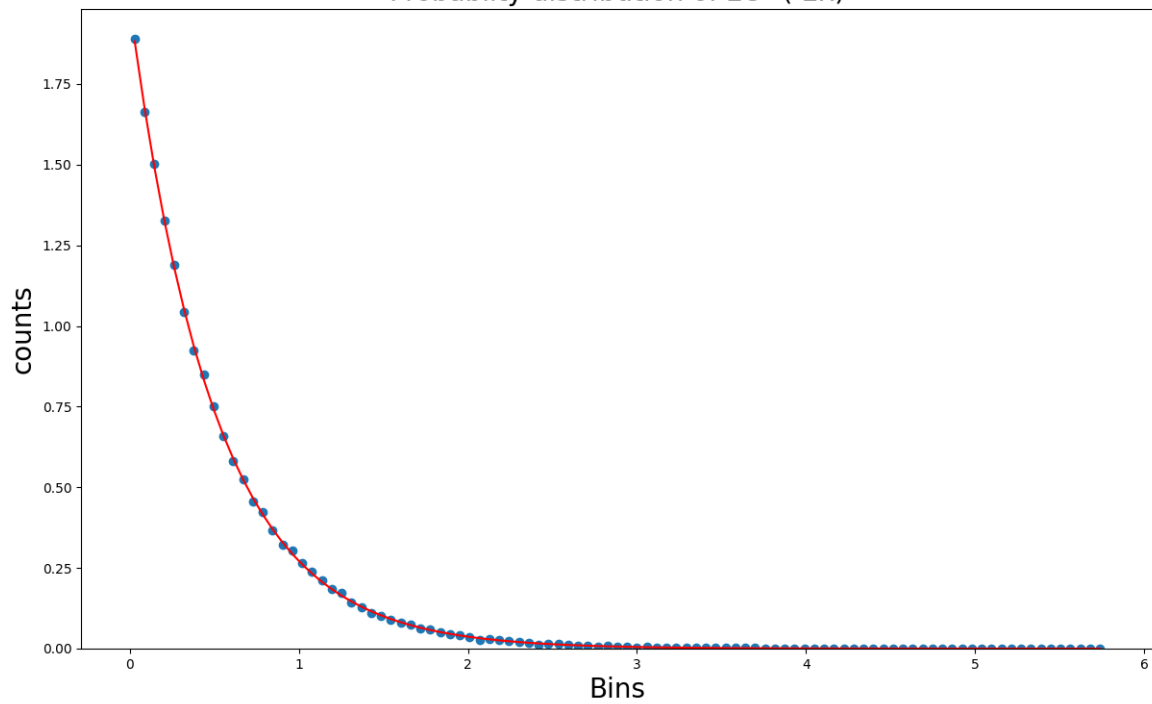
Q2 > ≡ avg\_and\_sigma.txt

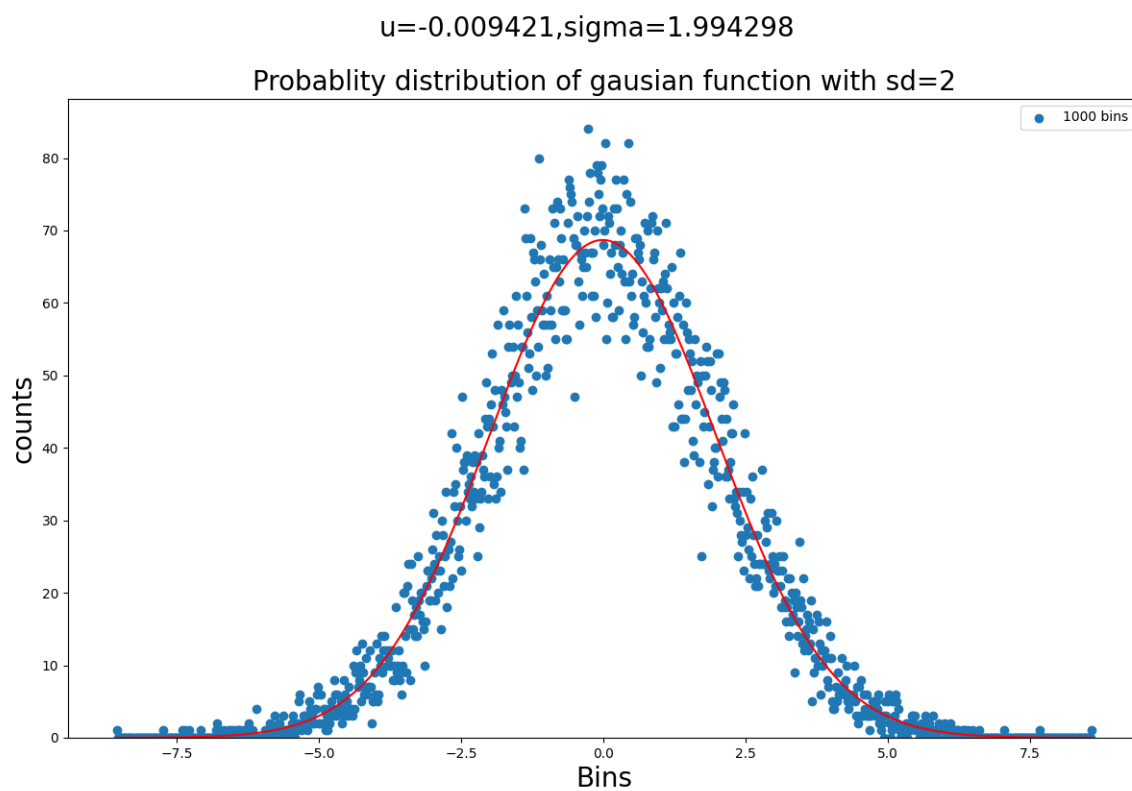
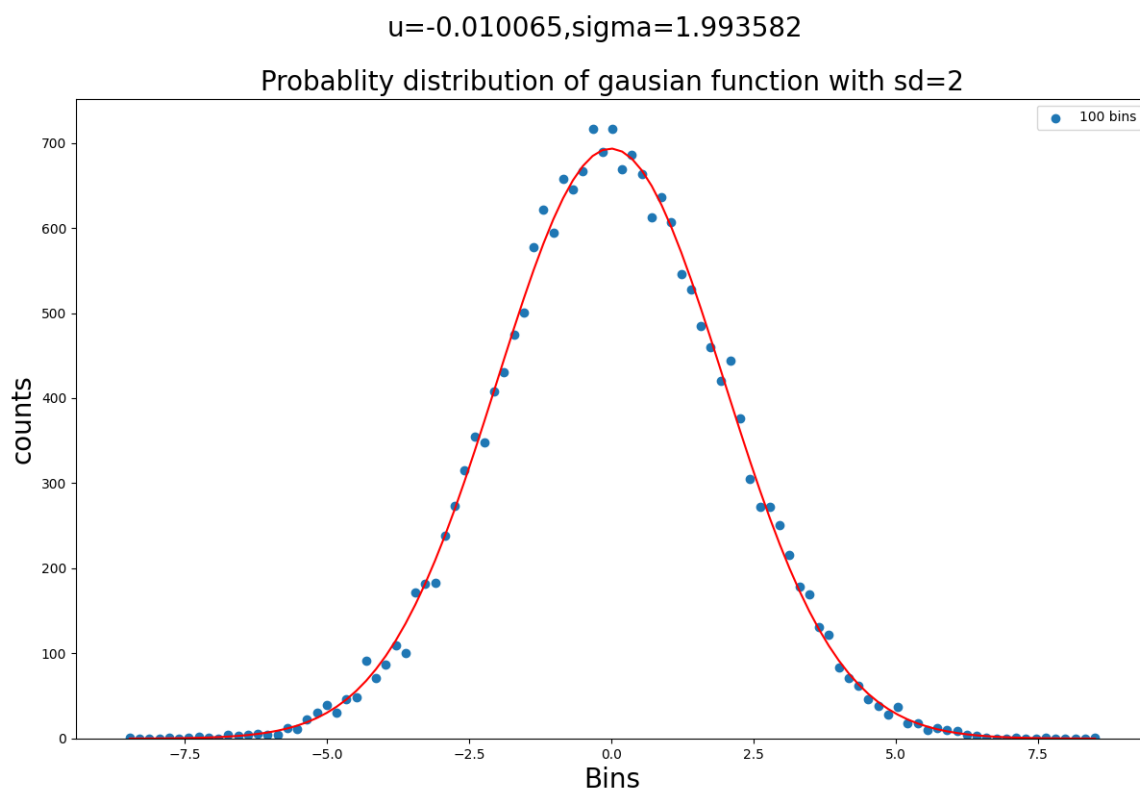
```
1 The mean and average of random number generating function
2 Average 0.50000948059982808
3 Sigma 0.28873535693815511
4
```

### 3 Q4

Fittig::y=1.9951671585930717e<sup>^</sup>(-1.9936284867098897x)

Probability distribution of 2e<sup>^</sup>(-2x)





## 4 Q5

### 4.1

```
● jetharam@Jetharams-MacBook-Air Q5 % gfortran brutemc.f90
● jetharam@Jetharams-MacBook-Air Q5 % ./a.out
  Brute force Monte Carlo
      10      1.6377250338703214E-019      1.5526730896060347E-019
     100      2.7218685285486850E-003      2.2141049045429299E-003
    1000      1.7726180538695411      1.7234297671932273
   10000      2.8552149314891699      1.4645577673266181
  100000      8.6924927881208358      2.7385135543312891
 1000000      10.737387158539043      0.95264530105333867
10000000      10.413051775879058      0.34546722957163312
● jetharam@Jetharams-MacBook-Air Q5 % gfortran imp_samp_mc.f90
● jetharam@Jetharams-MacBook-Air Q5 % ./a.out
  Important Sampling Monte Carlo
      10      12.905301855823652      2.9123437637764464
     100      11.373045622025666      0.81228176414487541
    1000      10.874866461291914      0.25821762991814656
   10000      10.938335024541619      8.0452433707551799E-002
  100000      10.994664228247139      2.5494282374380631E-002
 1000000      10.959176223600936      8.0470243903242068E-003
10000000      10.963936490386461      2.5461988500820295E-003
○ jetharam@Jetharams-MacBook-Air Q5 % □
```

### 4.2

```
● jetharam@Jetharams-MacBook-Air Q5 % gfortran brutemc.f90
● jetharam@Jetharams-MacBook-Air Q5 % ./a.out
  Brute force Monte Carlo
      10      3.7823050979728233E-012      3.2175579857706068E-012
     100      1.6583220187446068E-002      1.5523955573792211E-002
    1000      1.7930495666656838      1.6962949529012432
   10000      7.6054343445112140      5.5728187295361353
  100000      8.1543175184436993      1.6606244733553936
 1000000      11.036073510753512      1.4013804232111418
10000000      10.566896661983838      0.35082833019569104
● jetharam@Jetharams-MacBook-Air Q5 % gfortran imp_samp_mc.f90
● jetharam@Jetharams-MacBook-Air Q5 % ./a.out
  Important Sampling Monte Carlo
      10      12.799508596756805      1.8664221991940120
     100      10.662912193296377      0.87697484591790609
    1000      11.275593185332841      0.25646411826925064
   10000      10.879046540331956      8.0281782973739738E-002
  100000      10.944337359844409      2.5453481997357936E-002
 1000000      10.954248601526483      8.0451247245117308E-003
10000000      10.962314342595736      2.5454021411975471E-003
```

## 4.3

```
● jetharam@Jetharams-MacBook-Air Q5 % gfortran brutemc.f90
● jetharam@Jetharams-MacBook-Air Q5 % ./a.out
Brute force Monte Carlo
      10      2.3977437957045470E-015      2.2746433745590232E-015
     100      1.1985957526990682E-004      1.0046336663653906E-004
    1000      10.078123884340277      10.042640864213535
   10000      31.368637833803888      16.624998378602502
  100000      7.5236110821936757      1.8403318249981675
 1000000     13.002493155922251      1.1782125194439492
10000000     10.959551644189801      0.36630500260264737
● jetharam@Jetharams-MacBook-Air Q5 % gfortran imp_samp_mc.f90
● jetharam@Jetharams-MacBook-Air Q5 % ./a.out
Important Sampling Monte Carlo
      10      13.312597734284916      3.1417695110119879
     100      10.785983505209737      0.77269575906196319
    1000      10.961246554123385      0.24624360205445850
   10000      10.873439476677214      7.9572281031931980E-002
  100000      10.900954065352993      2.5404778447239172E-002
 1000000     10.961985547908096      8.0561617280704989E-003
10000000     10.959648582111067      2.5462795852102390E-003
○ jetharam@Jetharams-MacBook-Air Q5 % □
```

---

## 4.4

```
● jetharam@Jetharams-MacBook-Air q5 % ./a.out
Brute force Monte Carlo
      10      4.2676601263716902E-016      4.0486371048159200E-016
     100      6.5550913138635392E-005      5.3489679884002987E-005
    1000      0.30297883063837838      0.27628344061459470
   10000      10.250763291313801      8.9432145574069875
  100000      14.819135458346194      4.1480936071692822
 1000000      9.5718678846152319      0.92272814872547881
10000000     11.477023141539197      0.36619671914035201
● jetharam@Jetharams-MacBook-Air q5 % gfortran imp_samp_mc.f90
● jetharam@Jetharams-MacBook-Air q5 % ./a.out
Important Sampling Monte Carlo
      10      12.459792038404844      2.1118524622281241
     100      11.757943134101732      0.76475353246512734
    1000      10.589490921701287      0.24723099417451891
   10000      10.950654396636526      8.0619655909765345E-002
  100000      10.942715874784934      2.5463981948467902E-002
 1000000      10.969785646485510      8.0583182245686502E-003
10000000     10.962974764153465      2.5467856468108182E-003
○ jetharam@Jetharams-MacBook-Air q5 % □
```