IT542 Pattern Recognition and Machine Learning

Lab Assignment 1

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Assignments:

1) Draw 1000 samples from N(0,1).

Matlab Code:

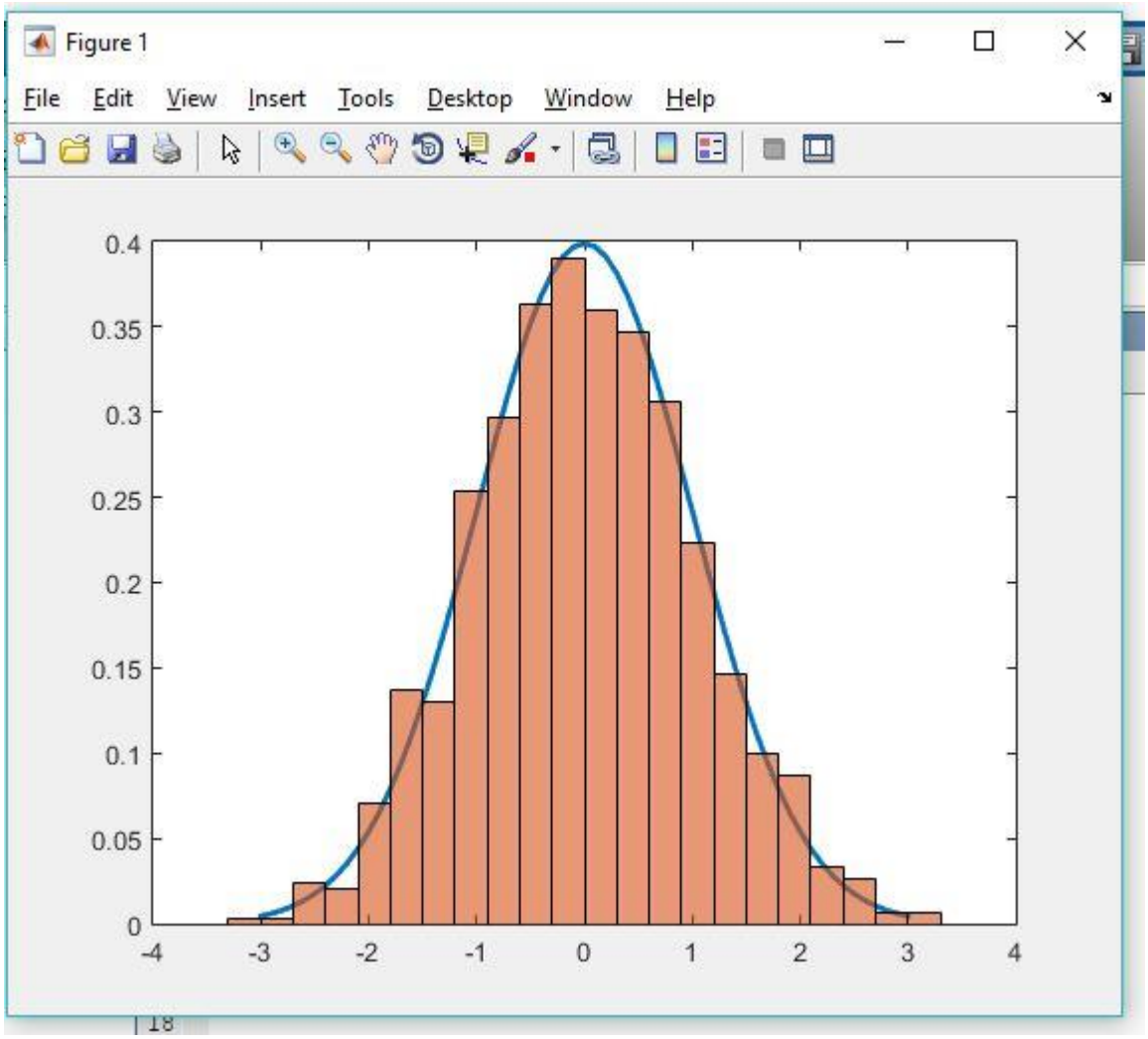
Editor - E:\Archan\Study\Mtech\Sem 2\New folder\Practicals\Lab 1\assign1.m

assign1.m | assign2.m | assign3.m | assign4.m | plot.m

```
X=randn(1,1000);
x=(-3:0.1:3);
m=0;
sig=;
p1=(x-m).^2;
p2=2*sig.^2;
p3=sig*sqrt(2*pi);
p4=1/p3;
p5=p1/p2;
p5=exp(-p5);
y=p4*p5;

figure;
plot(x,y,'LineWidth',2);
hold on;
histogram(X,'Normalization','pdf');
```

Output Figure:



Conclusion:

Using Gaussian Distribution Formula, I computed it in matlab, using simple matlab codes and found out the result after plotting the histogram vs curve obtained and understood the basics of Gaussian distribution and also got idea about the given Standard Normal Distribution. There is more amount of data obtained in the centre of the curve as well as in histogram which justifies the Gaussian Distribution.

2) Draw 1000 samples from N(10,25)

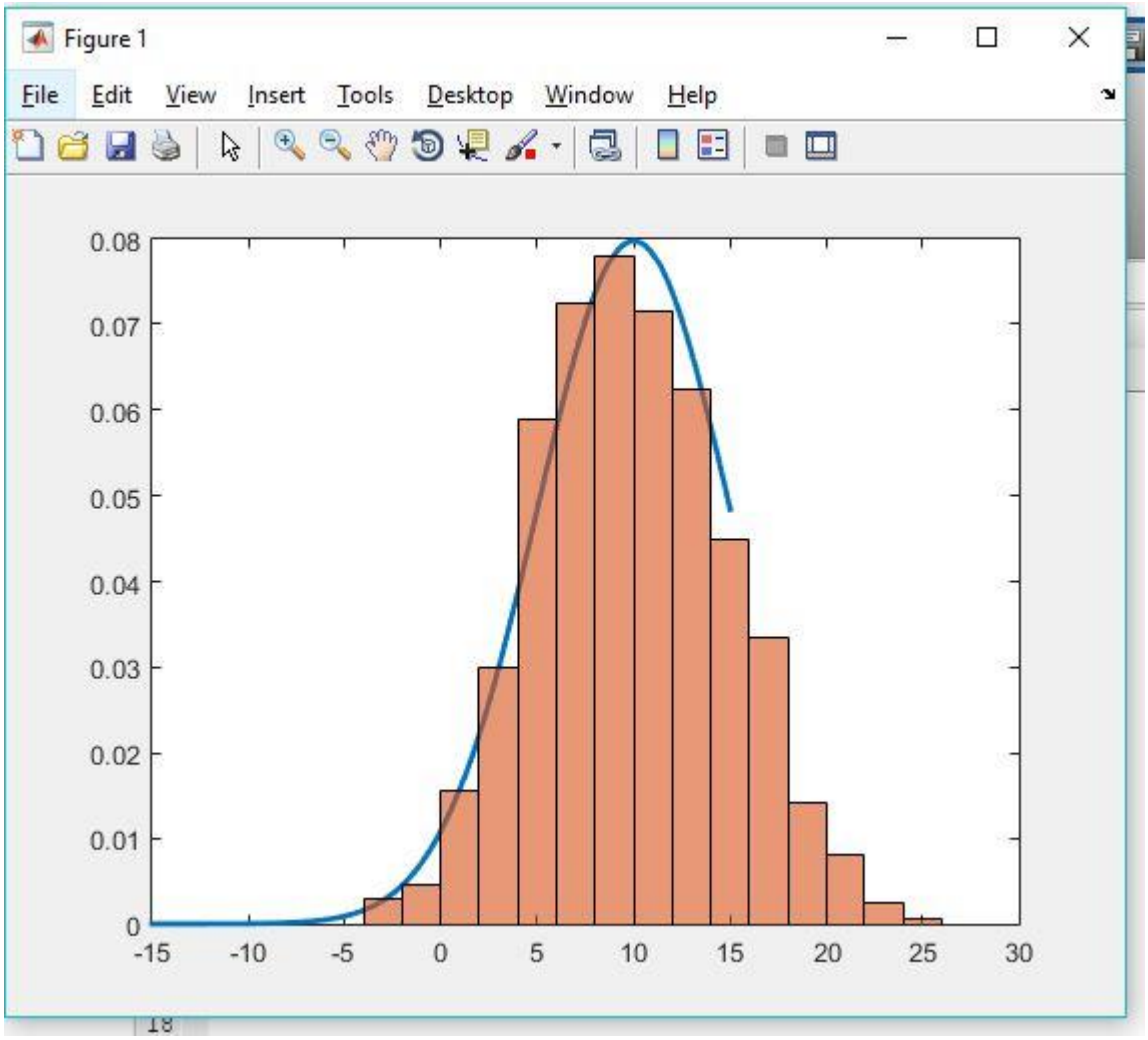
Matlab Code:

Editor - E:\Archan\Study\Mtech\Sem 2\New folder\Practicals\Lab 1\assign2.m

assign1.m | assign2.m | assign3.m | assign4.m | plot.m | histogram.r

```
1  -    X=10+5*randn(1,1000);
2  -    x=(-15:0.1:15);
3  -    m=10;
4  -    sig=5;
5  -    p1=(x-m).^2;
6  -    p2=2*sig.^2;
7  -    p3=sig*sqrt(2*pi);
8  -    p4=1/p3;
9  -    p5=p1/p2;
10 -    p5=exp(-p5);
11 -    y=p4*p5;
12
13 -    figure;
14 -    plot(x,y,'LineWidth',2);
15 -    hold on;
16 -    histogram(X,'Normalization','pdf');
17
18
19
```

Output Figure:



Conclusion:

After understanding the standard normal distribution, I tried this another assignment with mean value=10 and variance=25.It showed normal curve when I made output but when I merged it with histogram it resulted as shown above, I tried to look for the solutions online and asked my classmates too but was not able to figure it out. Without merging both the graphs the results are accurate and justifies Gaussian Normal distribution.

3) Draw 10000 samples for N(0,1).

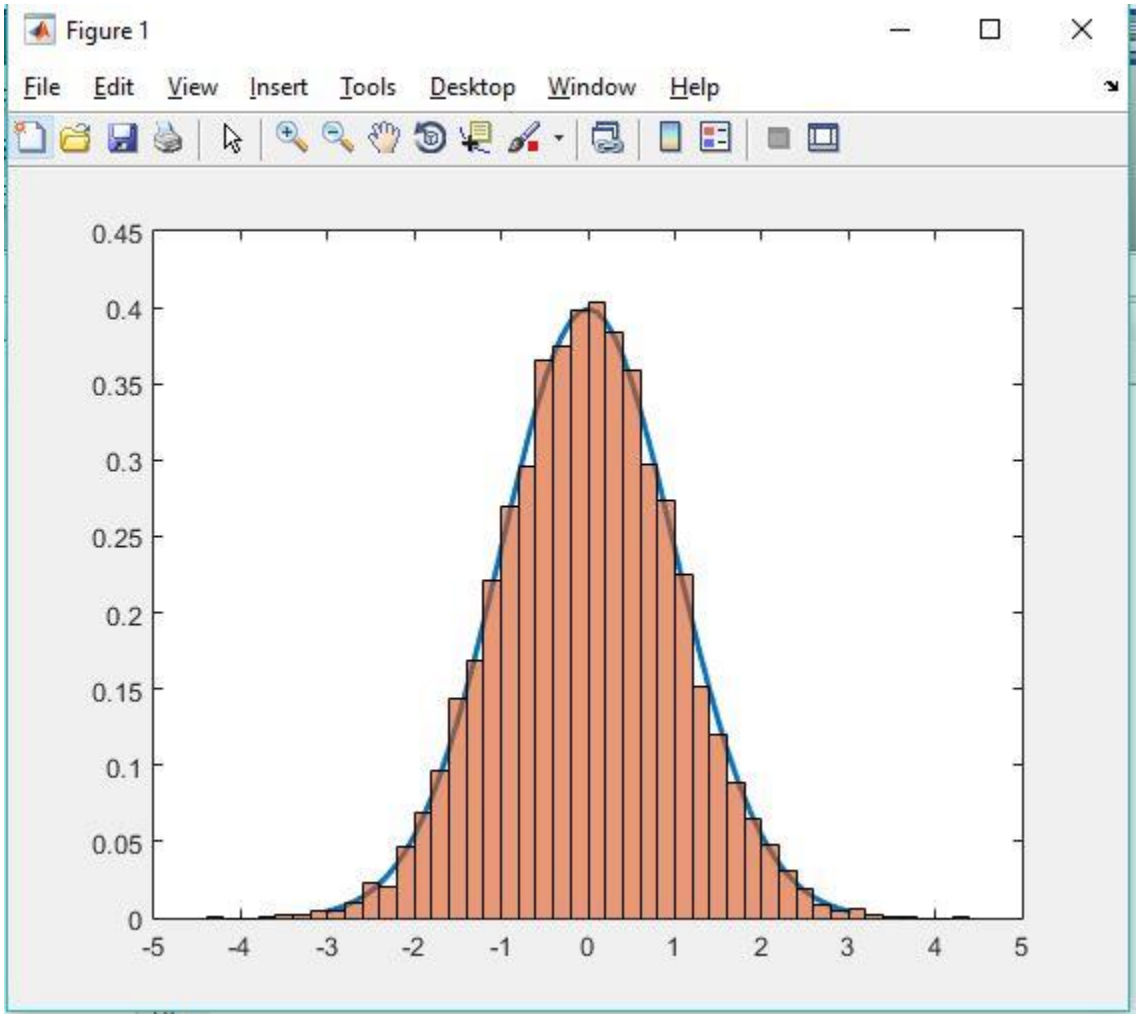
Matlab Code:

Editor - E:\Archan\Study\Mtech\Sem 2\New folder\Practicals\Lab 1\assign3.m

assign1.m | assign2.m | assign3.m | assign4.m | plot.m | histogram.m

```
1  X=randn(1,10000);
2  x=(-3:0.1:3);
3  m=0;
4  sig=1;
5  p1=(x-m).^2;
6  p2=2*sig.^2;
7  p3=sig*sqrt(2*pi);
8  p4=1/p3;
9  p5=p1/p2;
10 p5=exp(-p5);
11 y=p4*p5;
12
13 figure;
14 plot(x,y,'LineWidth',2);
15 hold on;
16 histogram(X,'Normalization','pdf');
17
18
19
```

Output Figure:



Conclusion:

Similar methods and procedures were used for this assignment, as were used in assignment 1, only number of samples were increased to 10000,and the results obtained are as shown in figure.

4) Draw 10000 samples for N(10,25).

Matlab Code:

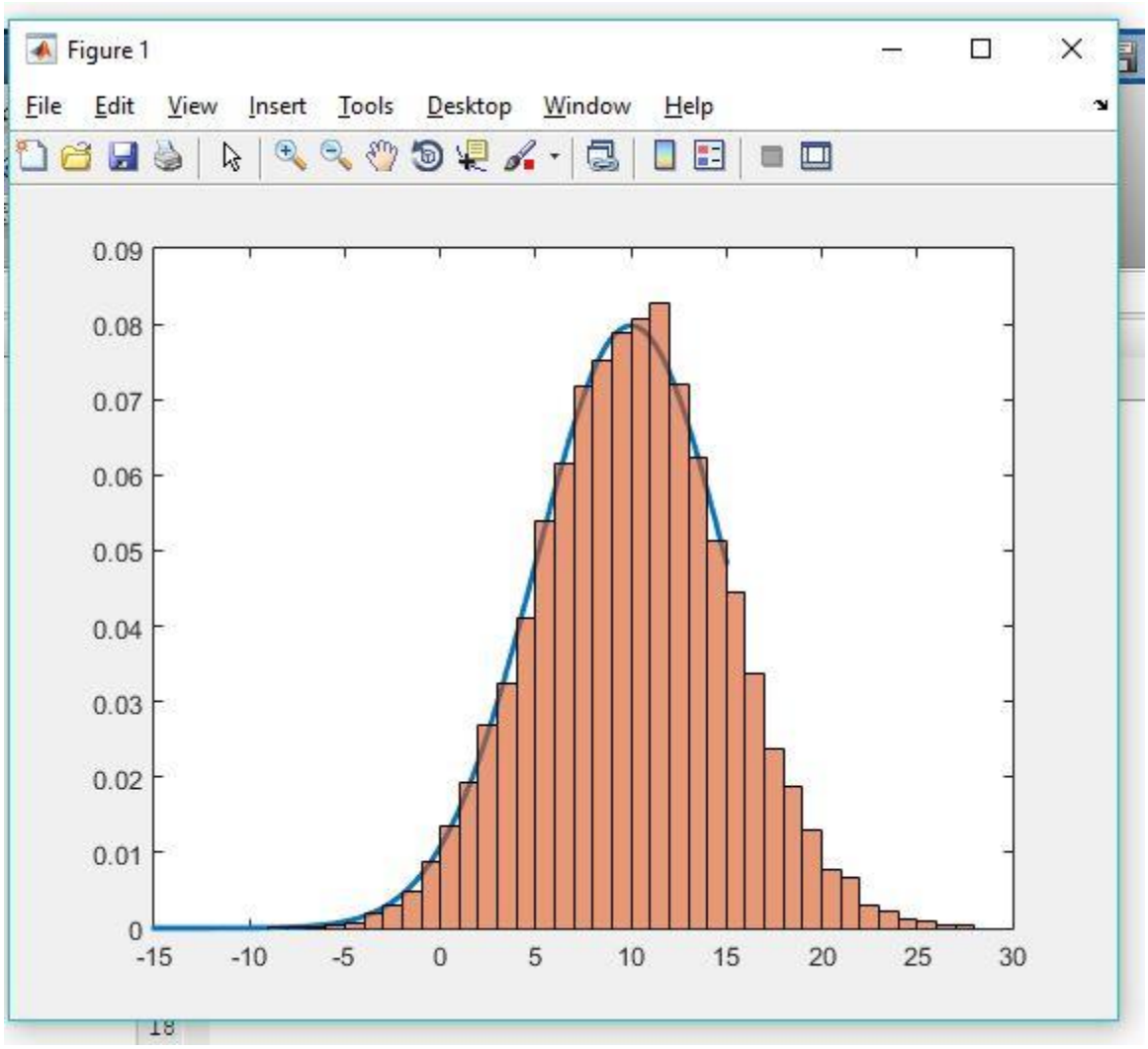
Editor - E:\Archan\Study\Mtech\Sem 2\New folder\Practicals\Lab 1\assign4.m

assign1.m | assign2.m | assign3.m | assign4.m | plot.m | histogram.m

```
X=10+5*randn(1,10000);
x=(-15:0.1:15);
m=10;
sig=5;
p1=(x-m).^2;
p2=2*sig.^2;
p3=sig*sqrt(2*pi);
p4=1/p3;
p5=p1/p2;
p5=exp(-p5);
y=p4*p5;

figure;
plot(x,y,'LineWidth',2);
hold on;
histogram(X,'Normalization','pdf');
```

Output Figure:



Conclusion:

Similar methods again here were used to calculate the distribution as were used in assignment 2, only the numbers of samples were increased to 10000 and the resultant distribution curve was obtained as shown in figure.

5) Using CLT theorem plot N(0,1).

Matlab Code:

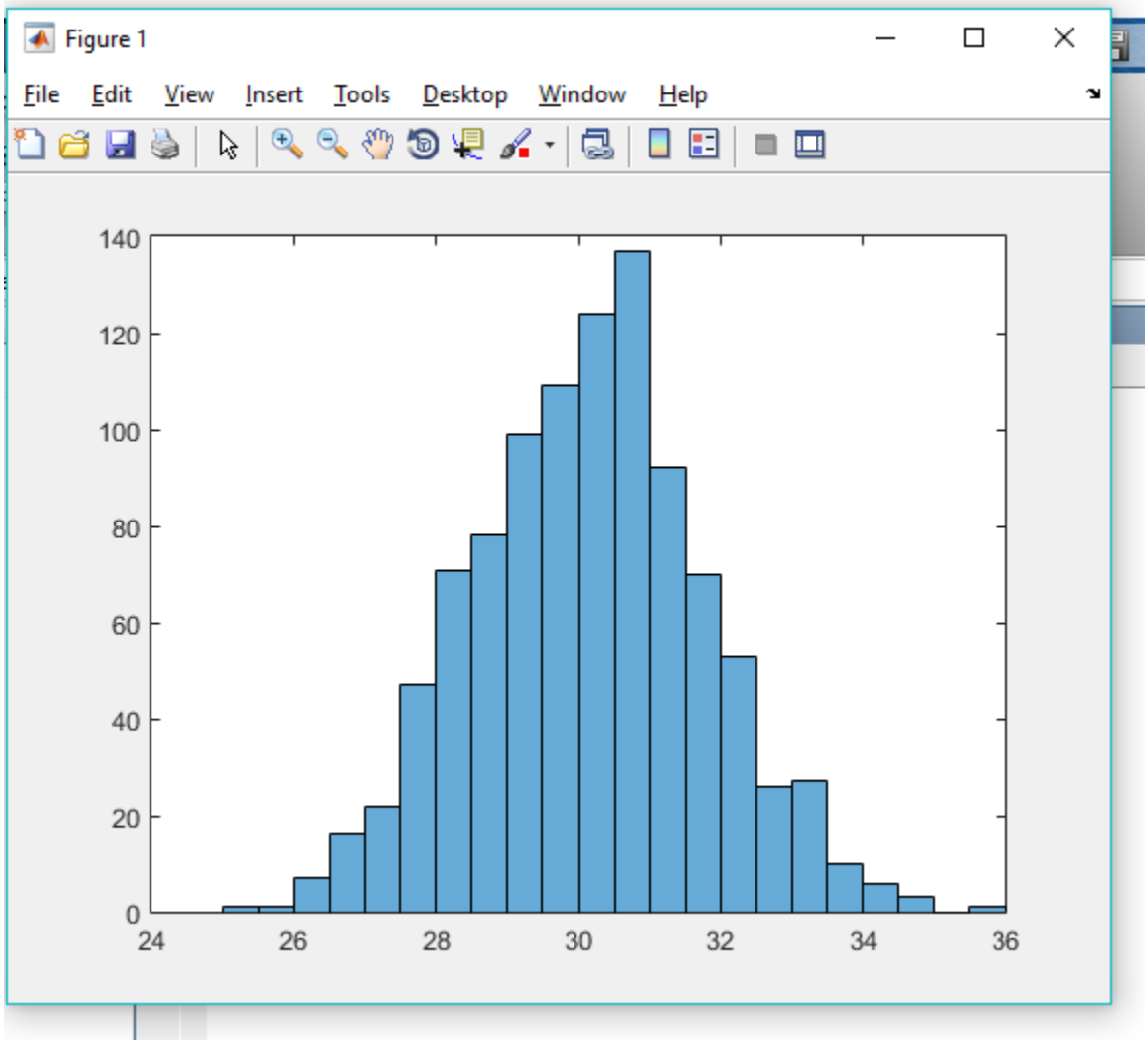
Editor - E:\Archan\Study\Mtech\Sem 2\New folder\Practicals\Lab 1\assign5.m

assign5.m

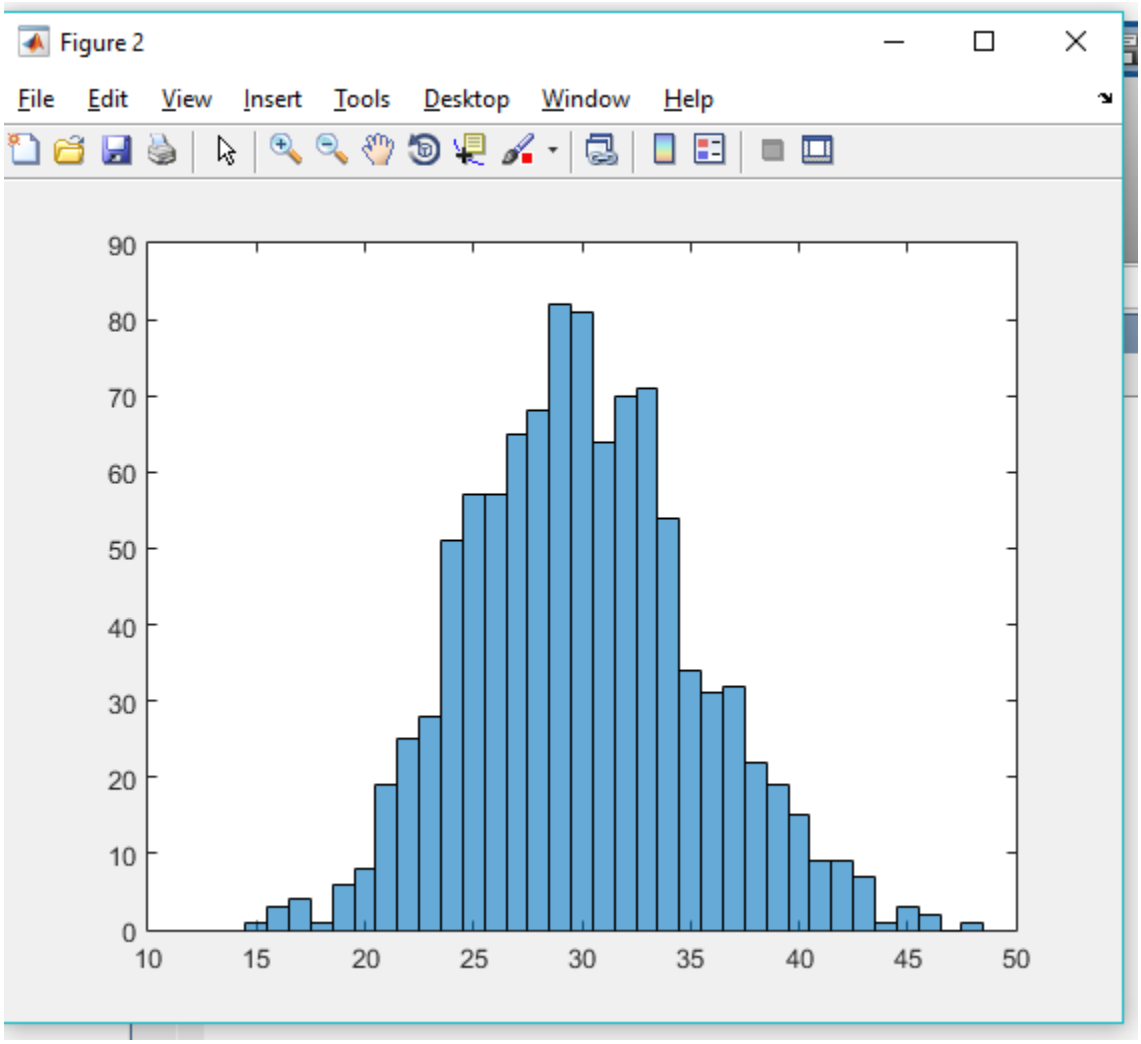
```
x = random('bino',1000,0.03,[1,1000]);
for i = 1:1000
    p1 = randi(1000,10,1);
    p2 = x(p1);
    p3(i) = mean(p2);
end
figure;
histogram(p3);
figure;
histogram(x);
```

Output Figure:

Histogram (p3):



Histogram (x):

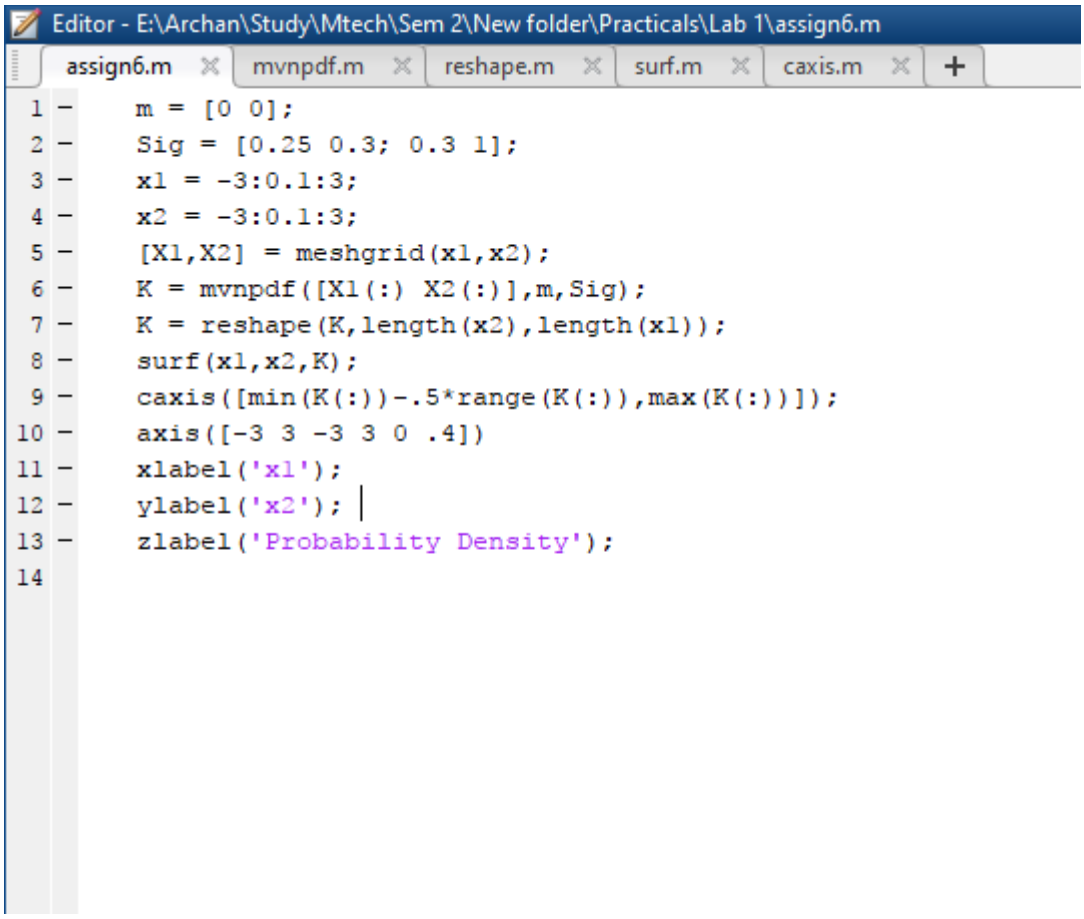


Conclusion:

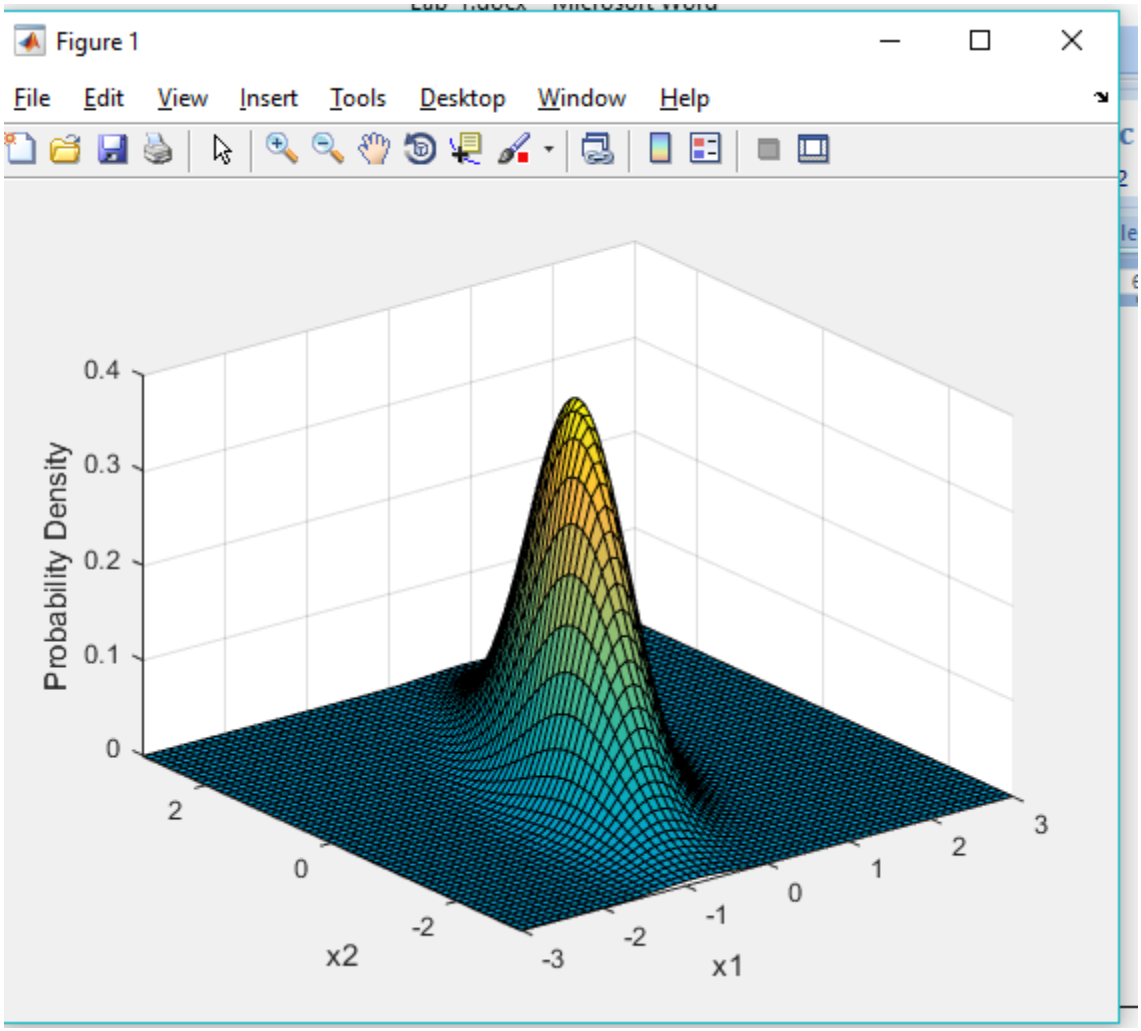
In this assignment we have used central limit theorem and after obtaining the output I compared the histogram with x and came to a conclusion that the result is true and works properly for finding normal distribution.

6) Compute Bivariate Normal distribution:

Matlab Code:



Output Figure:



Conclusion:

The results for Bivariate normal distribution are as mentioned in the figure, during this assignment I learned several new functions and found useful for computing the results.