BOĞAZİÇİ UNIVERSITY

CMPE 362: SIGNAL PROCESSING

SPRING 2019

Getting Started with MATLAB

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Contents

In this problem our x vector is between -100 and 100.With the x values i change the phase of the function so our graphics get different solutions.I use figure for collecting the all graphs about the first question and i use plot function to drawing the plots.

1 Problem 1

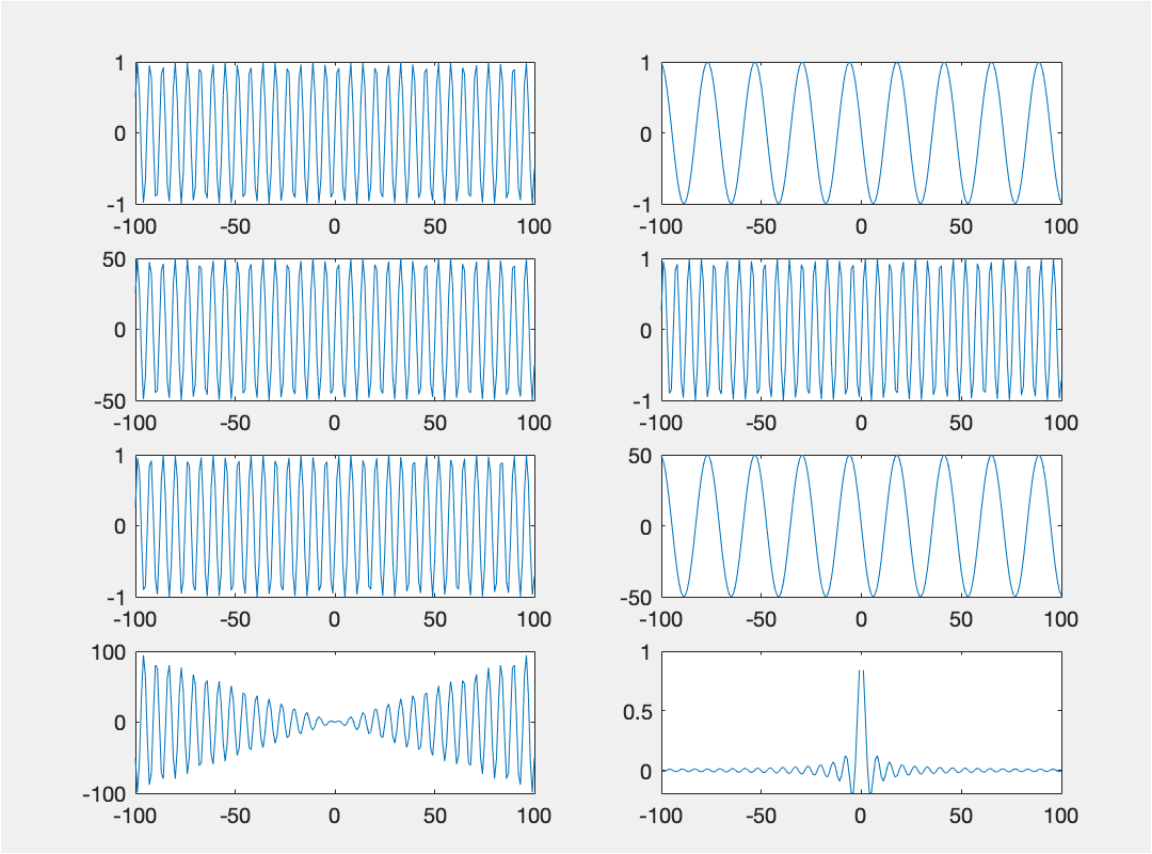

Figure 1: Problem 1 Graphical Output

In this problem our x vector is between -100 and 100.With the x values i change the phase of the function so our graphics get different solutions.I use figure for collecting the all graphs about the first question and i use plot function to drawing the plots.

2 Problem 2

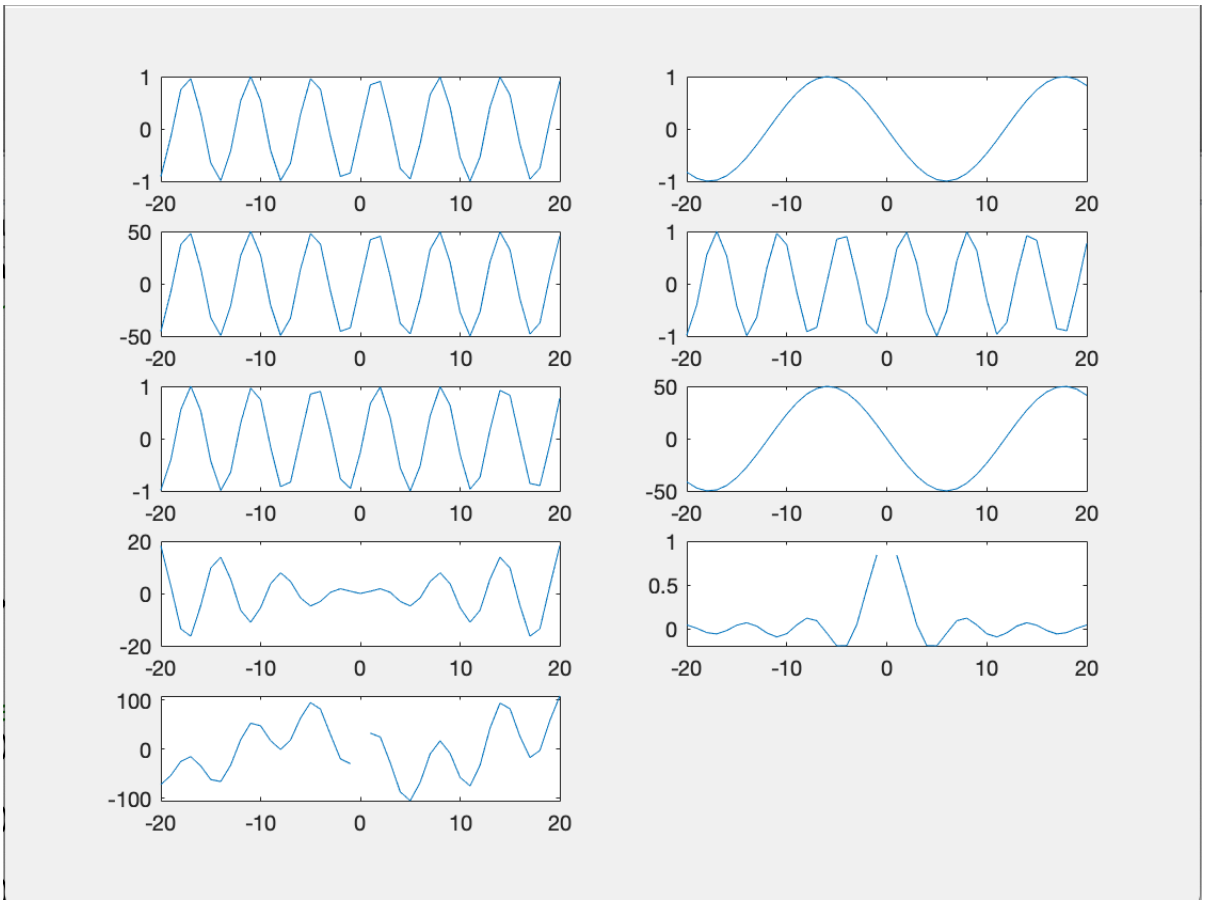

Figure 2: Problem 2 Graphical Output

In this problem i use randn function for producing 41 random values.

3 Problem 3

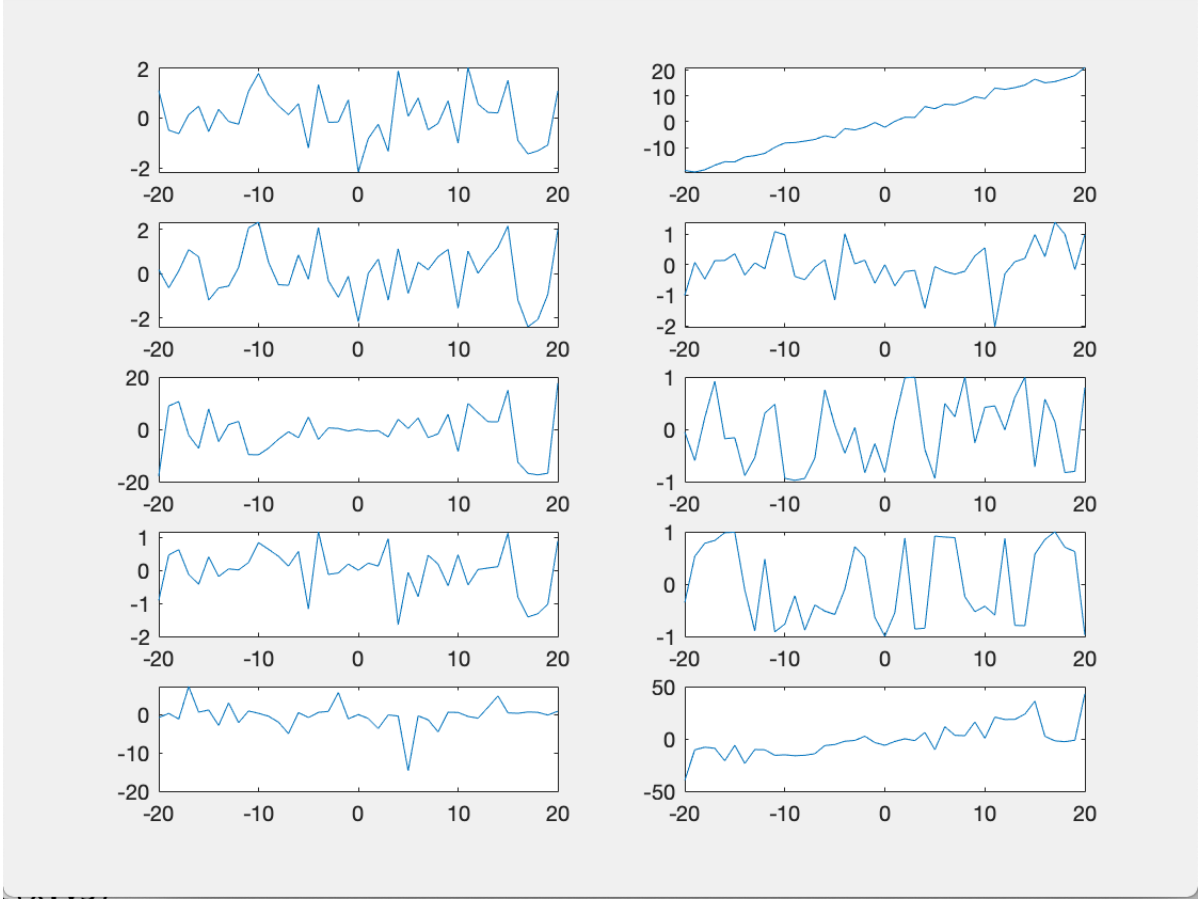

Figure 3: Problem 3 Graphical Output

In this problem i use rand function for producing 41 random values.

4 Problem 4

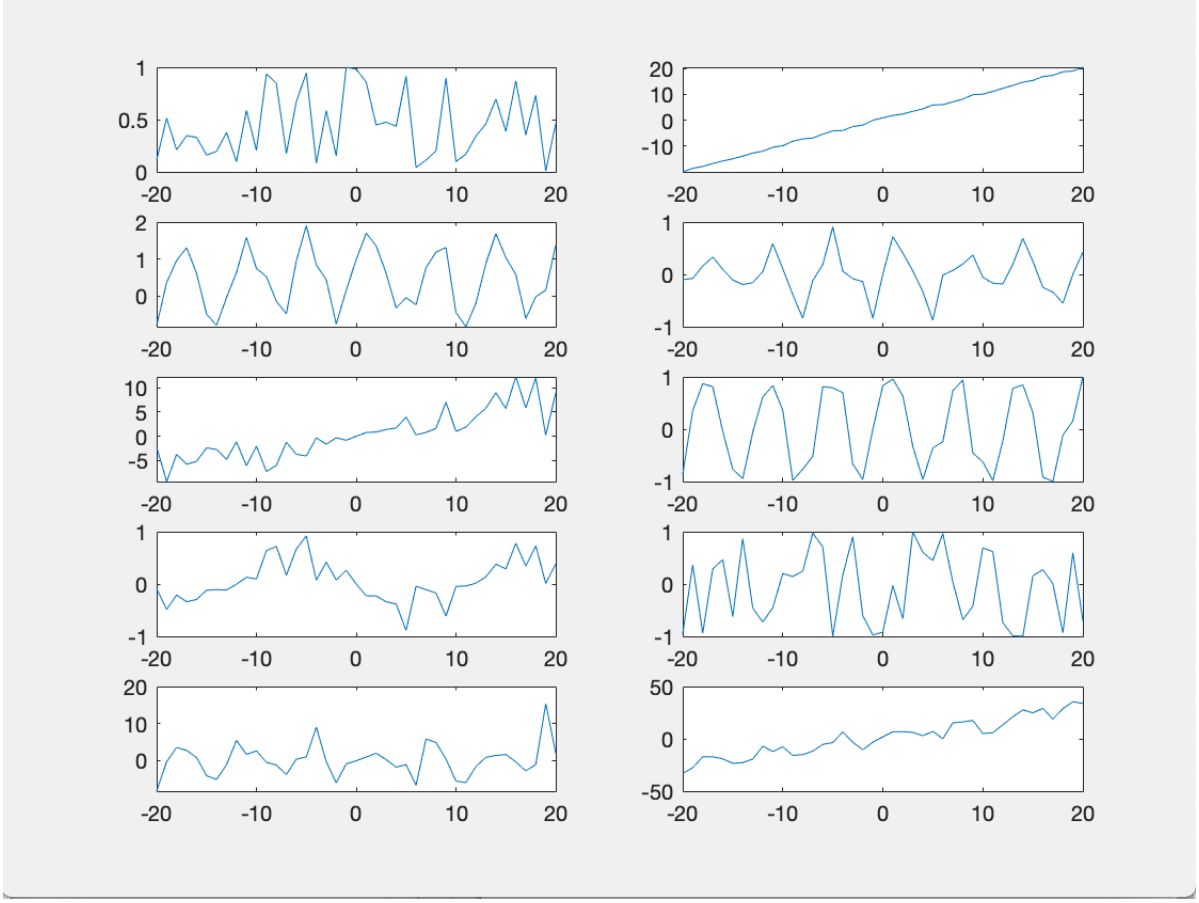

Figure 4: Problem 4 Graphical Output

In this problem i use hist function to draw the histograms.for producing the arndom number i use randn ne function.I created a normal distrubition

5 Problem 5

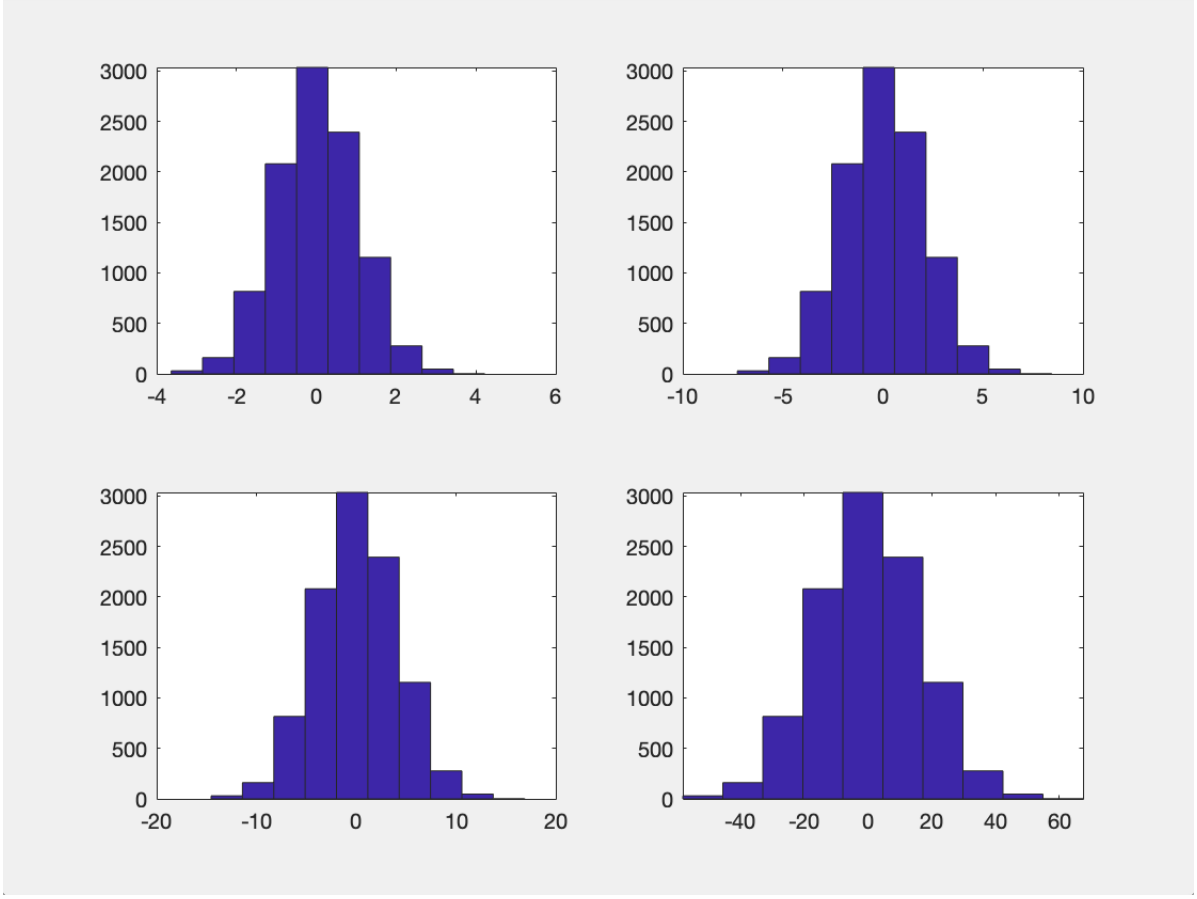

Figure 5: Problem 5 Graphical Output

In this problem i use hist function to draw the histograms.I created a normal distrubition

6 Problem 6

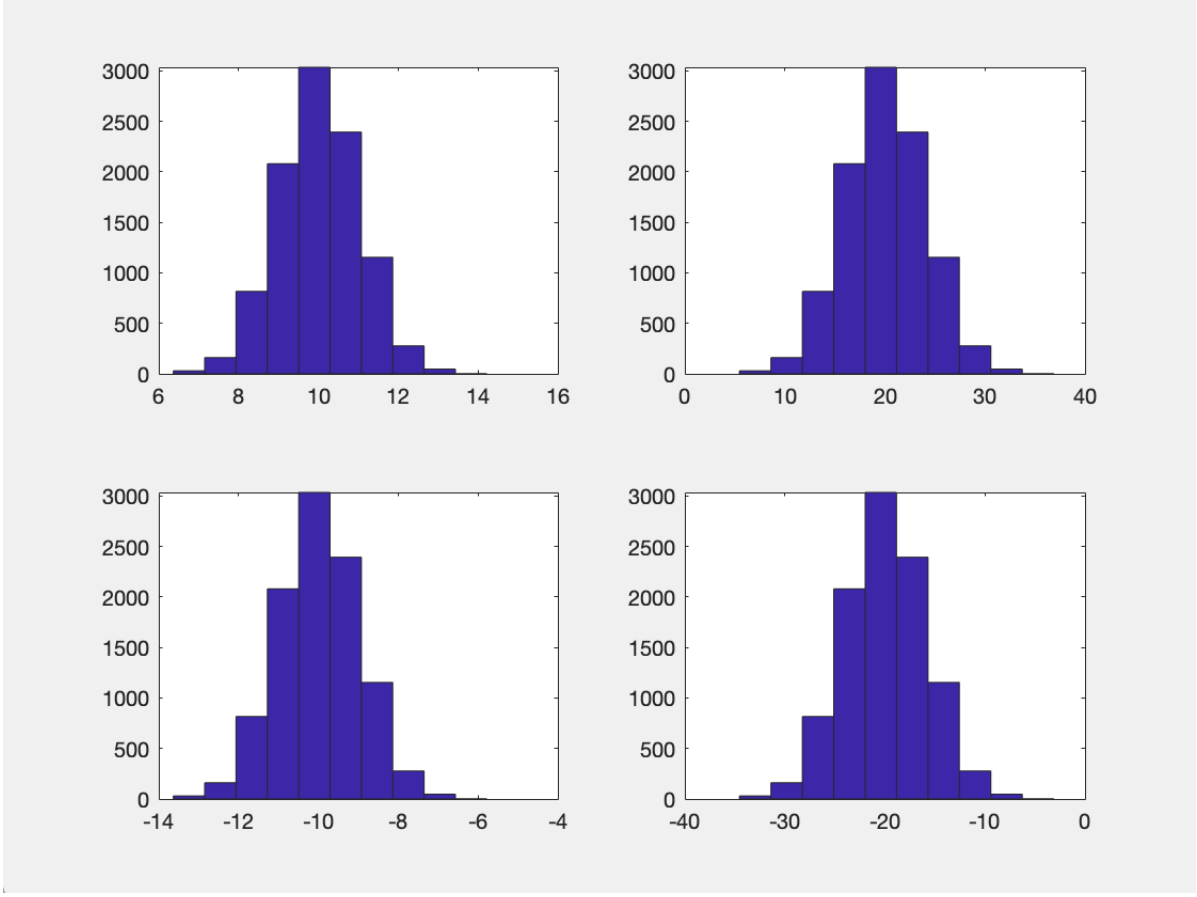

Figure 6: Problem 6 Graphical Output

In this problem i use hist function to draw the histograms.for producing the random number i use rand function.It is between 1 and 0

7 Problem 7

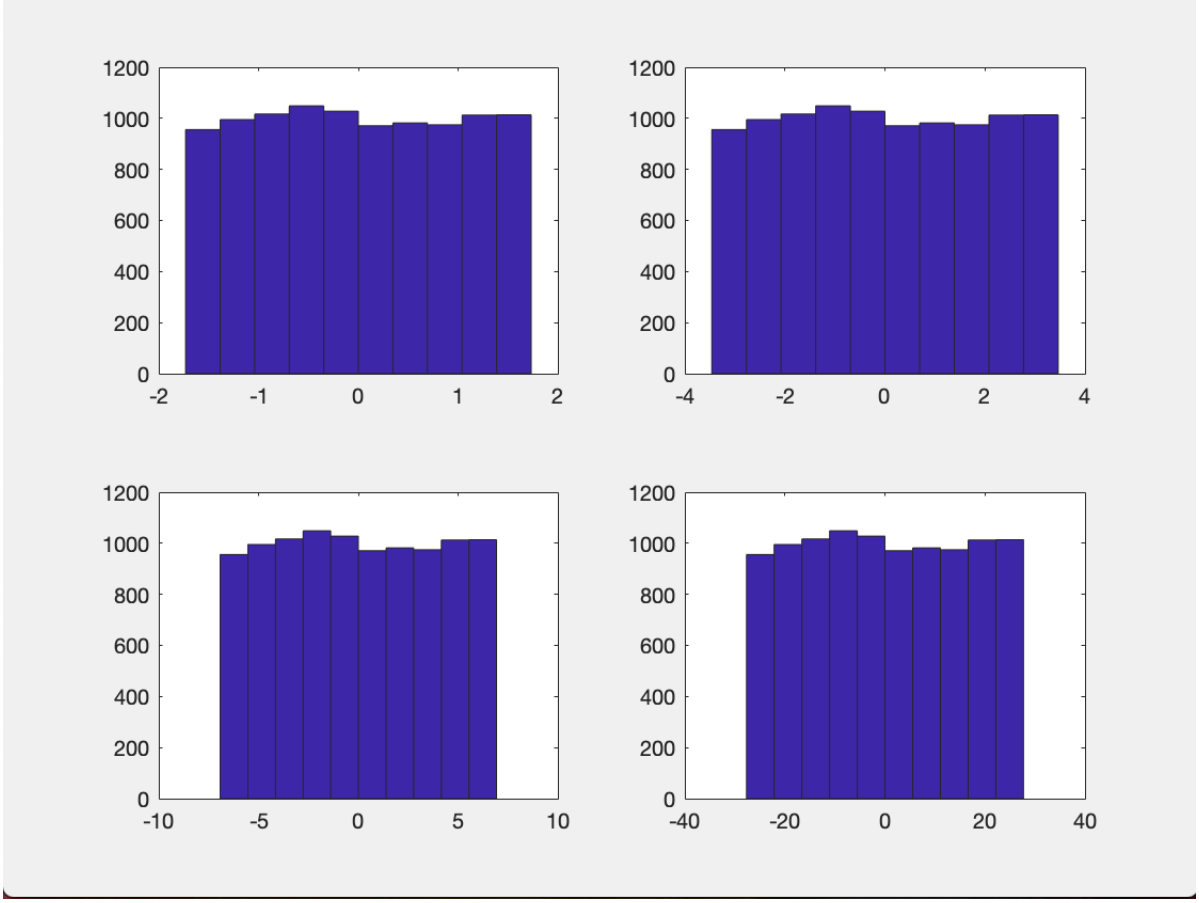

Figure 7: Problem 7 Graphical Output

In this problem i use hist function to draw the histograms.for producing the random number i use rand function.I changed the varians and mean.

8 Problem 8

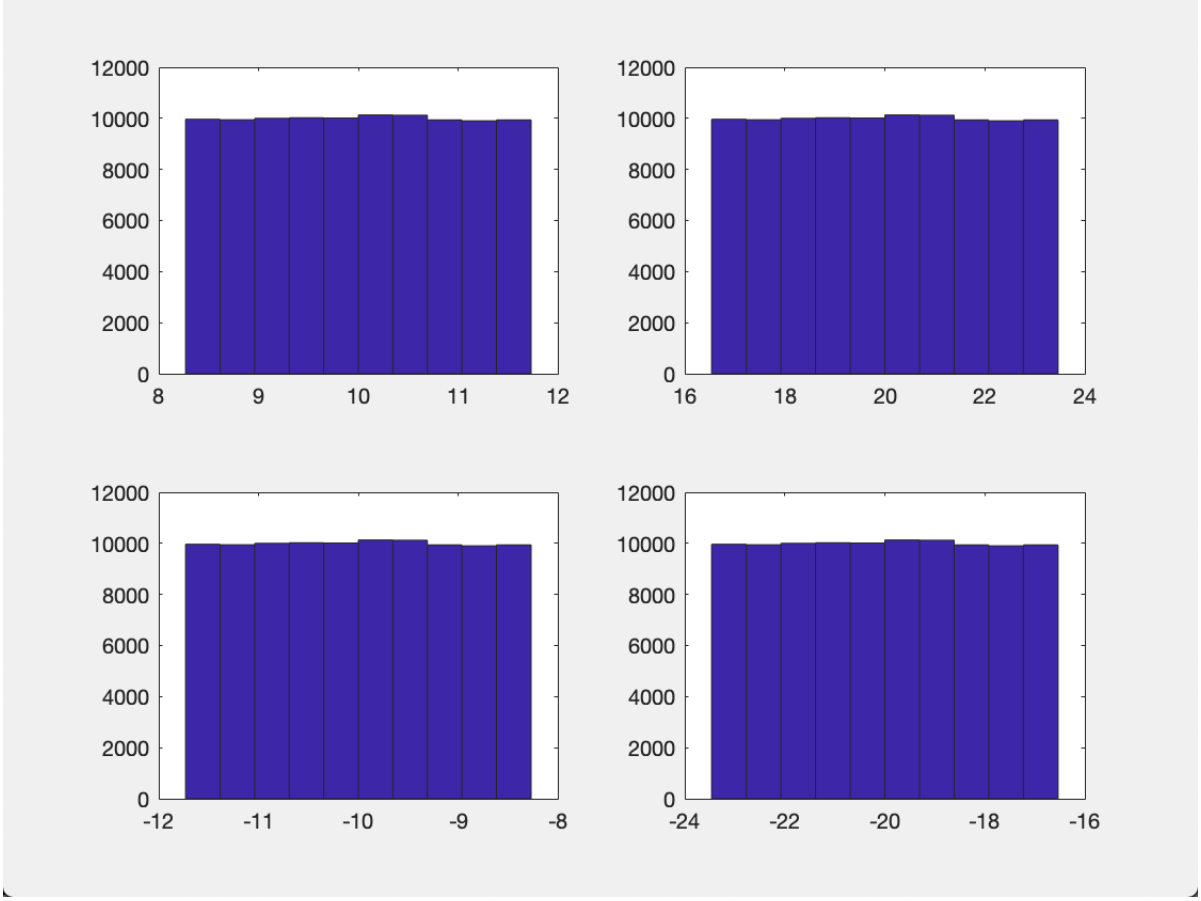

Figure 8: Problem 8 Graphical Output

In this problem ı read the csv file and find the peaks of the values.I see that many of the peak points are solved by the algorithm.Some peaks are not shown because they are too close to each other.

9 Problem 9

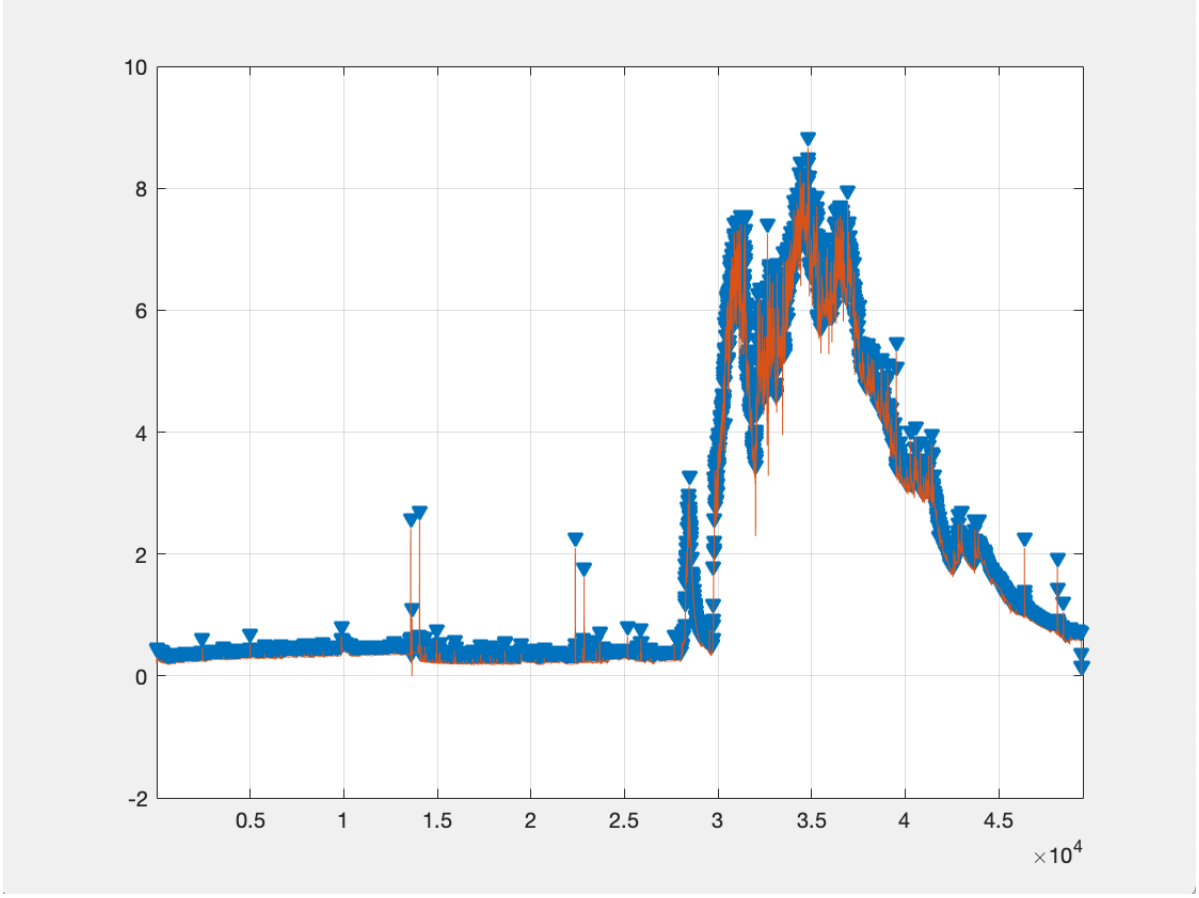

Figure 9: Problem 9 Graphical Output

$\mathbf{mean}_val = 124.0425 std_val = 47.8556 maxval = 245 max_row = 274 max_col = 396 minval = 25 min_row = 72 min_col = 4$

10 Problem 10

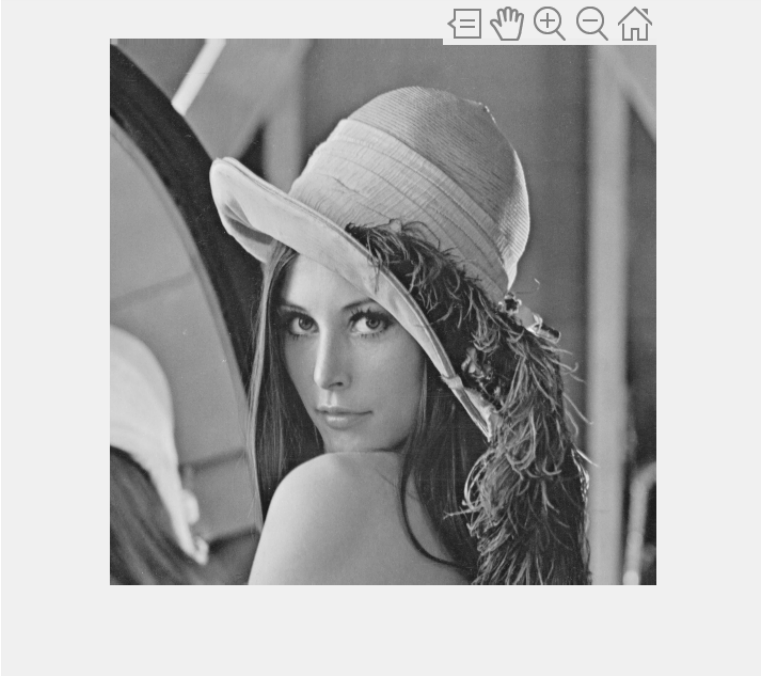

Figure 10: Problem 10 Graphical Output

11 Source Codes

You can find the code below:

11.1 Signal and Noise Source Codes

```
%question 1 answers

x=-100:100;
y1=sin(x);
y2=sin(50*x);
y3=50*sin(x);
y4=sin(x+50);
y5=sin(x+50);
y6=50*sin(50*x);
y7=x.*sin(x);
y8=sin(x)./x;
figure %made a figure and subplots on it
subplot(4,2,1)
plot(x,y1)
subplot(4,2,2)
plot(x,y2)
subplot(4,2,3)
plot(x,y3)
subplot(4,2,4)
plot(x,y4)
subplot(4,2,5)
plot(x,y5)
subplot(4,2,6)
plot(x,y6)
subplot(4,2,7)
plot(x,y7)
subplot(4,2,8)
plot(x,y8)

%question 2 answers

x=-20:20;
y1=sin(x);
y2=sin(50*x);
y3=50*sin(x);
y4=sin(x+50);
y5=sin(x+50);
y6=50*sin(50*x);
y7=x.*sin(x);
y8=sin(x)./x;
y9= y1+y2+y3+y4+y5+y6+y7+y8;
```

```
figure %made a figure and subplots on it
subplot(5,2,1)
plot(x,y1)
subplot(5,2,2)
plot(x,y2)
subplot(5,2,3)
plot(x,y3)
subplot(5,2,4)
plot(x,y4)
subplot(5,2,5)
plot(x,y5)
subplot(5,2,6)
plot(x,y6)
subplot(5,2,7)
plot(x,y7)
subplot(5,2,8)
plot(x,y8)
subplot(5,2,9)
plot(x,y9)

%question 3 answers

z=randn(1,41);
y10=z;
y11=z+x;
y12=z+sin(x);
y13=z .* sin(x);
y14=x .* sin(z);
y15=sin(x+z);
y16=z .* sin(50 * x);
y17=sin(x+50 * z);
y18=sin(x)./z;
y19=y11+y12+y13+y14+y15+y16+y17+y18;
figure %made a figure and subplots on it
subplot(5,2,1);
plot(x,y10)
subplot(5,2,2);
plot(x,y11)
subplot(5,2,3);
plot(x,y12)
subplot(5,2,4);
plot(x,y13)
subplot(5,2,5);
plot(x,y14)
subplot(5,2,6);
plot(x,y15)
subplot(5,2,7);
plot(x,y16)
```

```
subplot(5,2,8);
plot(x,y17)
subplot(5,2,9);
plot(x,y18)
subplot(5,2,10);
plot(x,y19)

%question 4 answers

z=rand(1,41);
y20=z;
y21=z+x;
y22=z+sin(x);
y23=z .* sin(x);
y24=x .* sin(z);
y25=sin(x+z);
y26=z .* sin(50 * x);
y27=sin(x+50 * z);
y28=sin(x)./z;
y29=y21+y22+y23+y24+y25+y26+y27+y28;
figure %made a figure and subplots on it
subplot(5,2,1);plot(x,y20)
subplot(5,2,2);plot(x,y21)
subplot(5,2,3);plot(x,y22)
subplot(5,2,4);plot(x,y23)
subplot(5,2,5);plot(x,y24)
subplot(5,2,6);plot(x,y25)
subplot(5,2,7);plot(x,y26)
subplot(5,2,8);plot(x,y27)
subplot(5,2,9);plot(x,y28)
subplot(5,2,10);plot(x,y29)

%question 5 answers
z=randn([1,10000]);
r1=1 .* z+0;
r2=2 .* z+0;
r3=4 .* z+0;
r4=16 .* z+0;
figure
subplot(2,2,1);hist(r1)
subplot(2,2,2);hist(r2)
subplot(2,2,3);hist(r3)
subplot(2,2,4);hist(r4)

%question 6 answers
r5=1 .* z+10;
r6=2 .* z+20;
r7=1 .* z+(-10);
```

```
r8=2 .* z+(-20);
figure
subplot(2,2,1);hist(r5)
subplot(2,2,2);hist(r6)
subplot(2,2,3);hist(r7)
subplot(2,2,4);hist(r8)

%question 7 answers

z=rand([1 10000])-0.5;
r11=sqrt(12.*1) .* z+0;
r21=sqrt(12.*4) .* z+0;
r31=sqrt(12.*16) .* z+0;
r41=sqrt(12.*256) .* z+0;
figure
subplot(2,2,1);hist(r11)
subplot(2,2,2);hist(r21)
subplot(2,2,3);hist(r31)
subplot(2,2,4);hist(r41)

%question 8 answers
z=rand(100000 ,1)-0.5
r61=sqrt(12.*1) .* z+10;
r71=sqrt(12.*4) .* z+20;
r81=sqrt(12.*1) .* z-10;
r91=sqrt(12.*4) .* z-20;
figure
subplot(2,2,1); hist(r61)
subplot(2,2,2); hist(r71)
subplot(2,2,3); hist(r81)
subplot(2,2,4); hist(r91)
```

11.2 Question 9 Source Codes

```
filename = 'exampleSignal.csv';
M = csvread(filename);
figure
findpeaks(M);
hold on;
plot(M);
hold off;
```

11.3 Question 10 Source Codes

```
img = imread('lena.png');
image(img);
imgGray = rgb2gray(img);
imshow(imgGray);

```

```
meanval = mean2(imgGray)
val = std2(imgGray)
[M, I] = min(imgGray(:))
[M1, I1] = max(imgGray(:))

[I_row, I_col] = ind2sub(size(imgGray),I)
M1 = min(min(imgGray))

[A_row, A_col] = ind2sub(size(imgGray),I1)
M2 = max(max(imgGray))
```

12 Introduction

In this Project i heve learned the principles of the Matlab Programming.This Project make me openminded about how to use matrises.I needed to read some documents about MATLAB so i learned some more information about functions.This problem is solved with some basic plot,rand,randn,hist,max,min functions.This Project gives me informations about how to use matlab and in which situations i will use matlab.

13 Encountered Problems

I learned basic matlab structure and syntax .this project is introduction project of the matlab project so it is not much hard but it has enough difficulties for the first matlab project.Matlab is very convenient and useful programming language for matris usage.If i try to compare with other languages.Matlab has some strange errors or usage.I faced with an error which is ıf i write ";" symbol.It not give an output.

I think matlab is not proper language for web application or mobile apps.It's main usage is as i said matematical problems but maybe matlab has some function or features which ı don't know.