

DSAA ASSIGNMENT

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Section A

Answer 1

```
image1=imread('/home/varun/Pictures/Webcam/2018-02-12-012021.jpg');

figure(1);
imshow(image1);

figure(2);
imshow(image1(:,:,1));

figure(3);
imshow(image1(:,:,2));

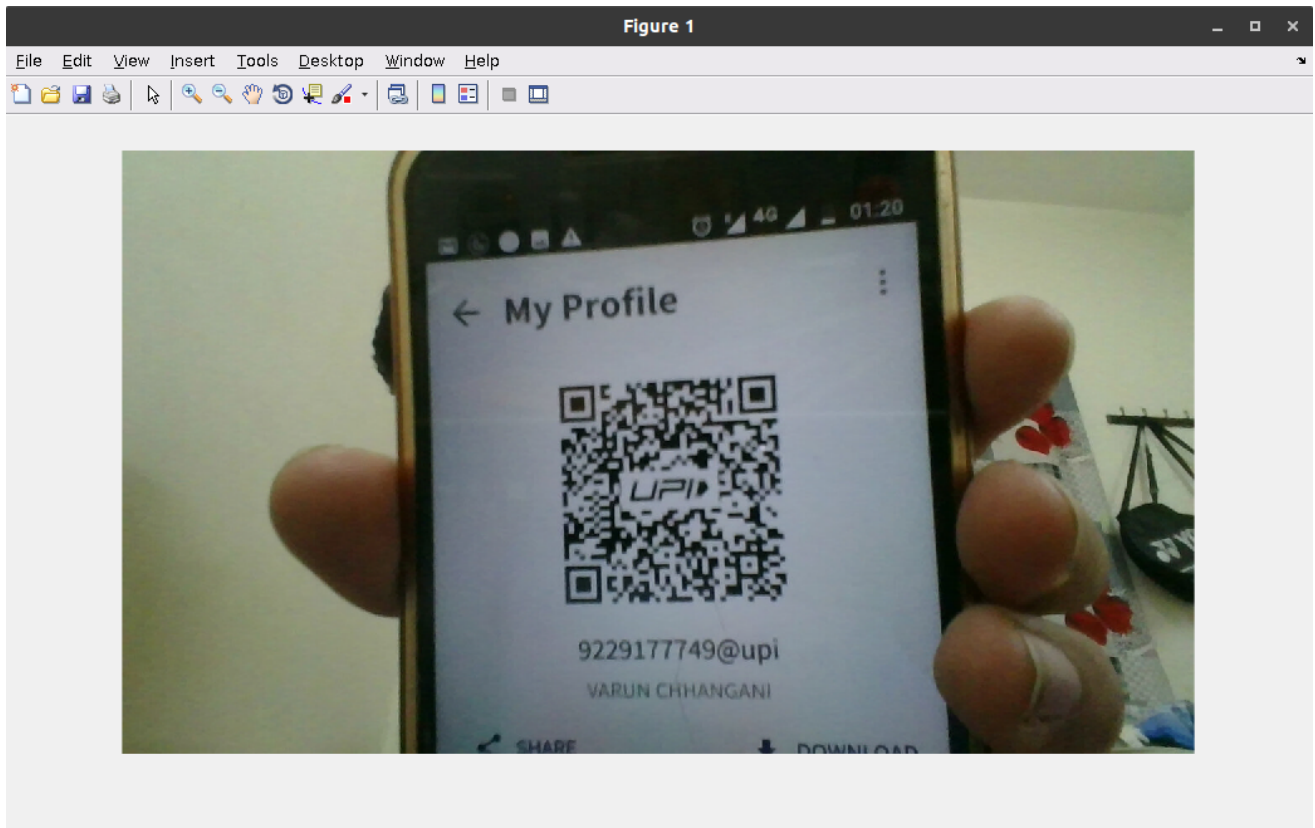
figure(4);
imshow(image1(:,:,3));

disp("Min of image red component:"+min(min(image1(:,:,1))));
disp("Min of image green component:"+min(min(image1(:,:,2))));
disp("Min of image blue component:"+min(min(image1(:,:,3))));

disp("Mean of image red component:"+mean2(image1(:,:,1)));
disp("Mean of image green component:"+mean2(image1(:,:,2)));
disp("Mean of image blue component:"+mean2(image1(:,:,3)));

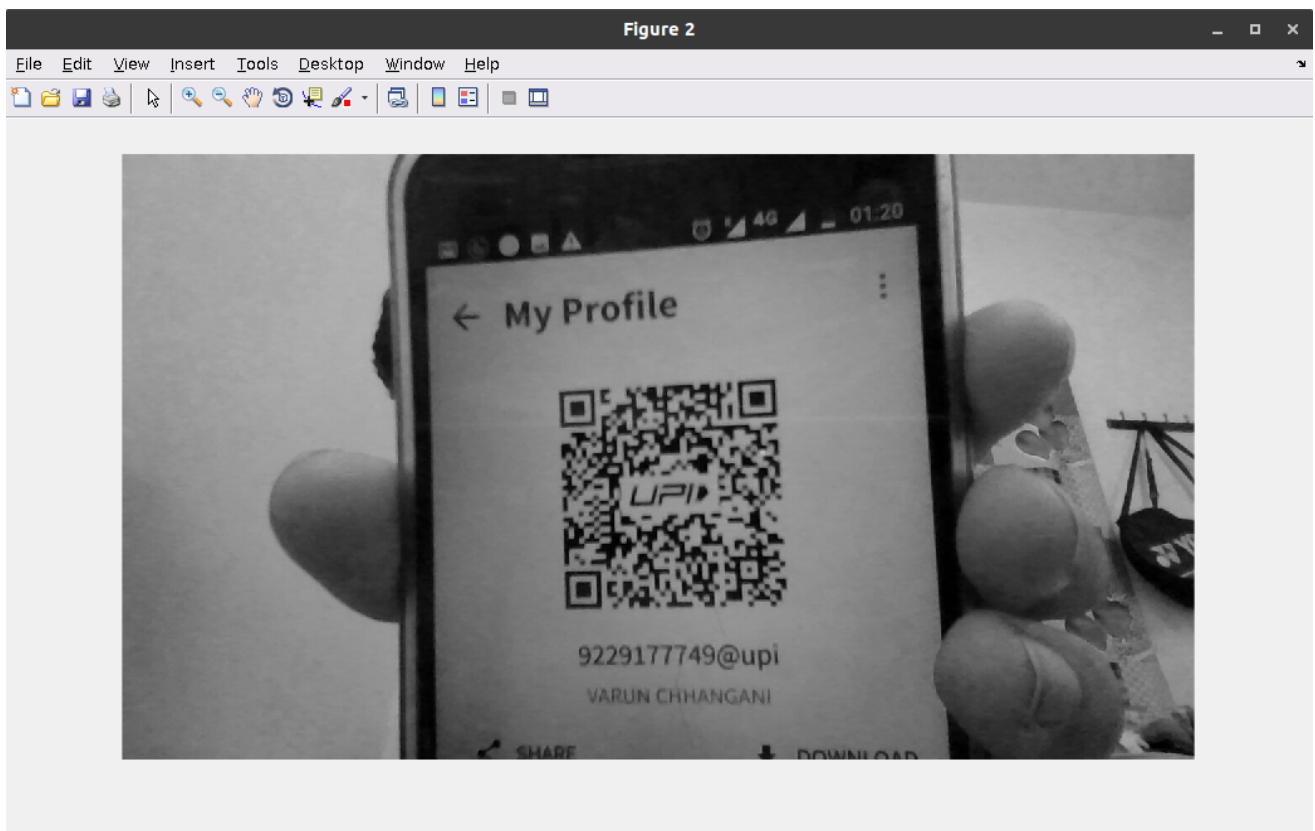
disp("Max of image red component:"+max(max(image1(:,:,1))));
disp("Max of image green component:"+max(max(image1(:,:,2))));
disp("Max of image blue component:"+max(max(image1(:,:,3))));

size(image1)
```

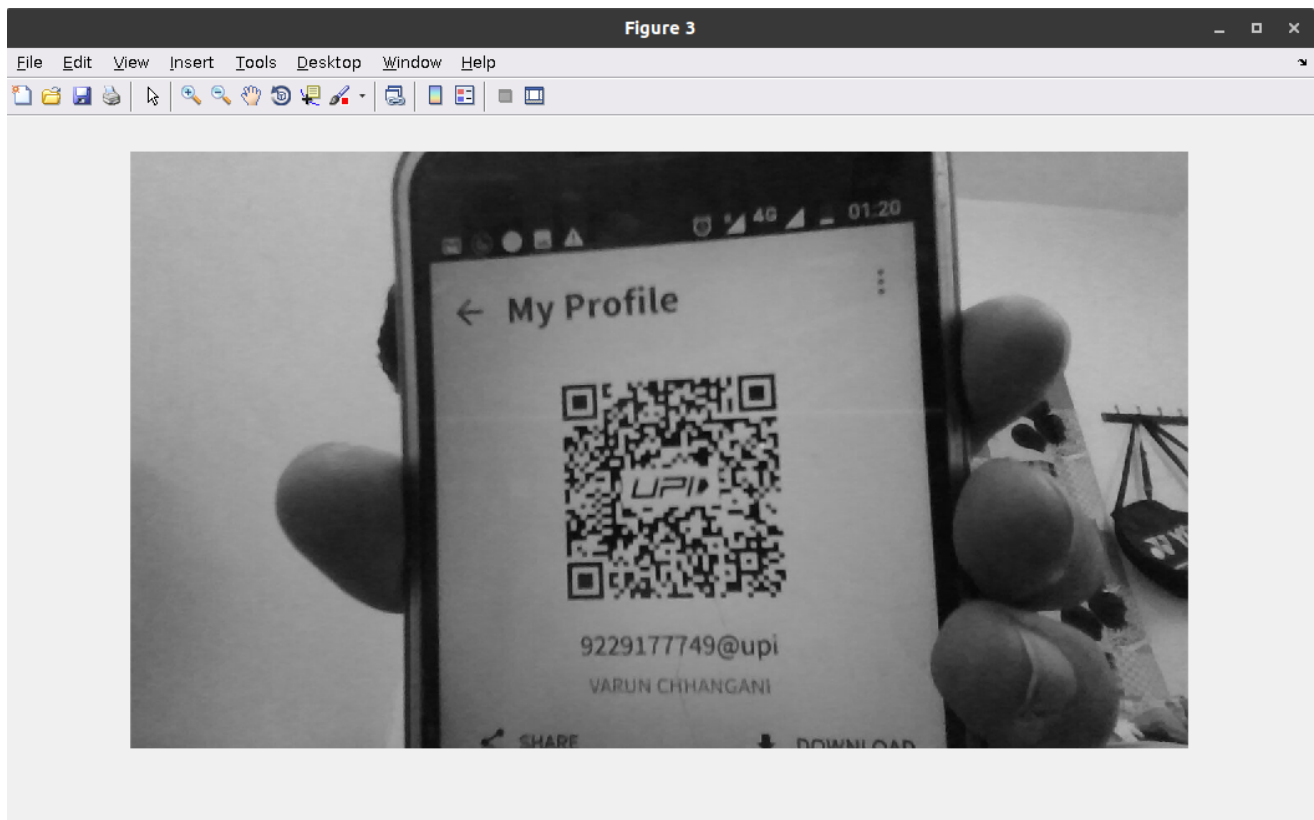


- There are three independent variables in the image. The variables are: x and y content.
- There are three components: the different colors: red, blue and green.

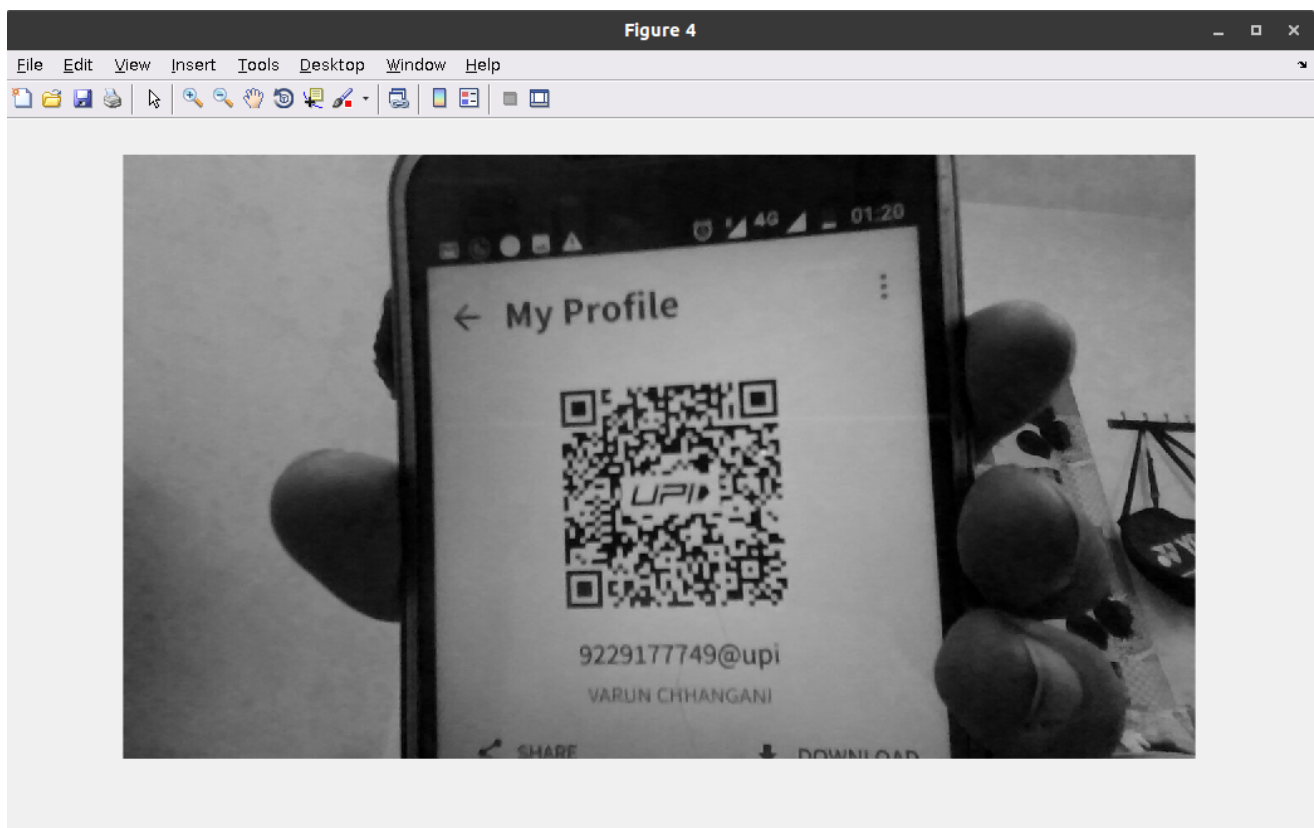
Red Component:



Green Component:



Blue Component:



- Min of image red component:0
 - Min of image green component:1
 - Min of image blue component:0
-
- Mean of image red component:112.4867
 - Mean of image green component:116.4987
 - Mean of image blue component:106.5967
-
- Max of image red component:200
 - Max of image green component:193
 - Max of image blue component:208

ans =

720	1280	3
-----	------	---

Therefore the size of image is 720x1280.

Answer 2

```
r2=audiorecorder(22050,16,2)
record(r2);
%Say Something in different microphones connected to PC and are on
stop(r2);
r2data=getaudiodata(r2);
figure(1);
plot(r2data(:,1));
figure(2);
plot(r2data(:,2));
sum(sum(r2data.^2))
```

Output in console:

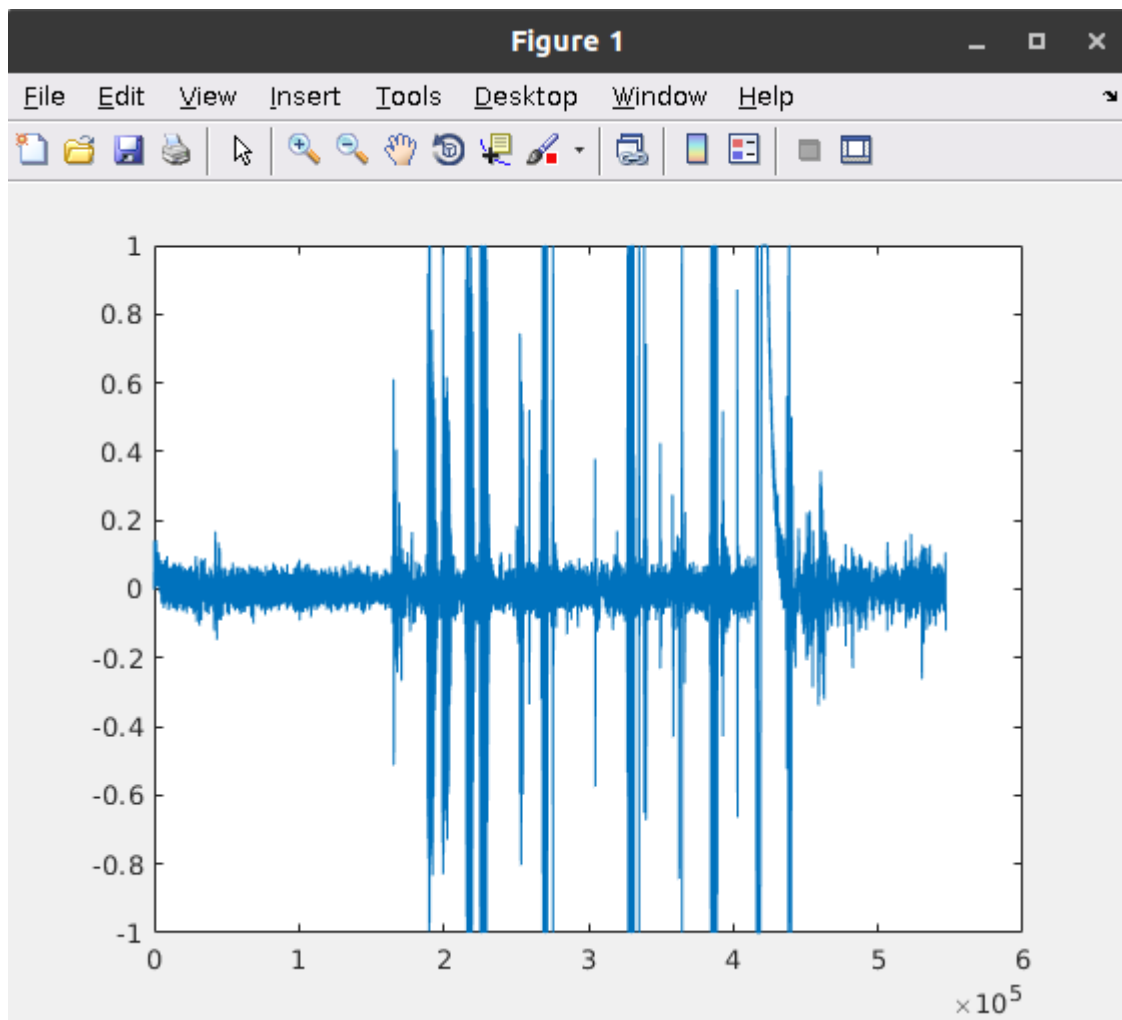
```
r2 =

audiorecorder with properties:

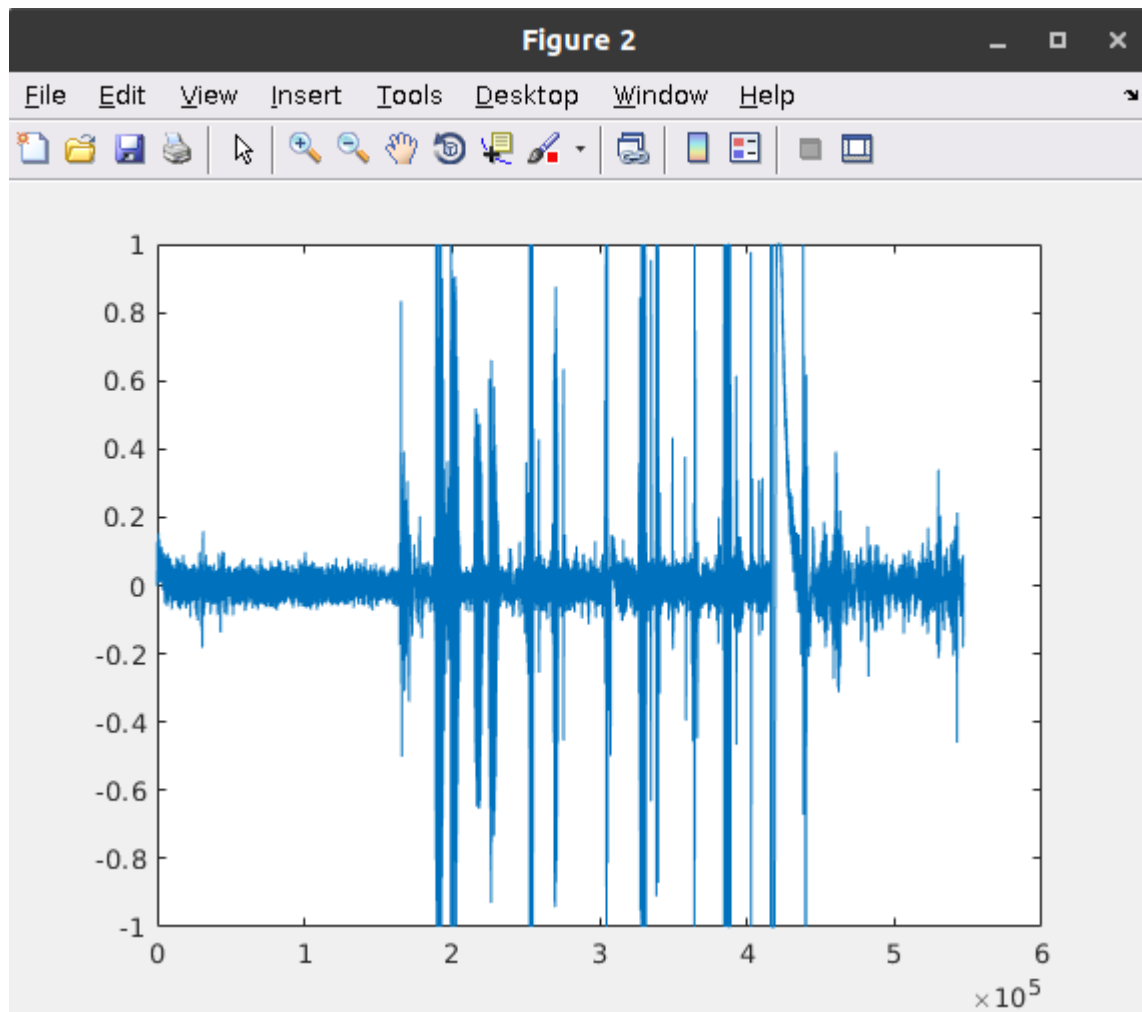
    SampleRate: 22050
    BitsPerSample: 16
    NumberOfChannels: 2
    DeviceID: -1
    CurrentSample: 1
    TotalSamples: 546816
    Running: 'off'
    StartFcn: []
```

```
StopFcn: []  
TimerFcn: []  
TimerPeriod: 0.0500  
Tag: ''  
UserData: []  
Type: 'audiorecorder'  
  
ans =  
  
3.8349e+04
```

1. Left Channel:



2. Right Channel:



- The Signal and the code is shown above
- There are 2 channels in my recorded voice.
- The Signal is analog.
- There are 546816 values(samples recorded) in each signal.
- Energy of the signal is 38349 J .

Section B

Answer 1

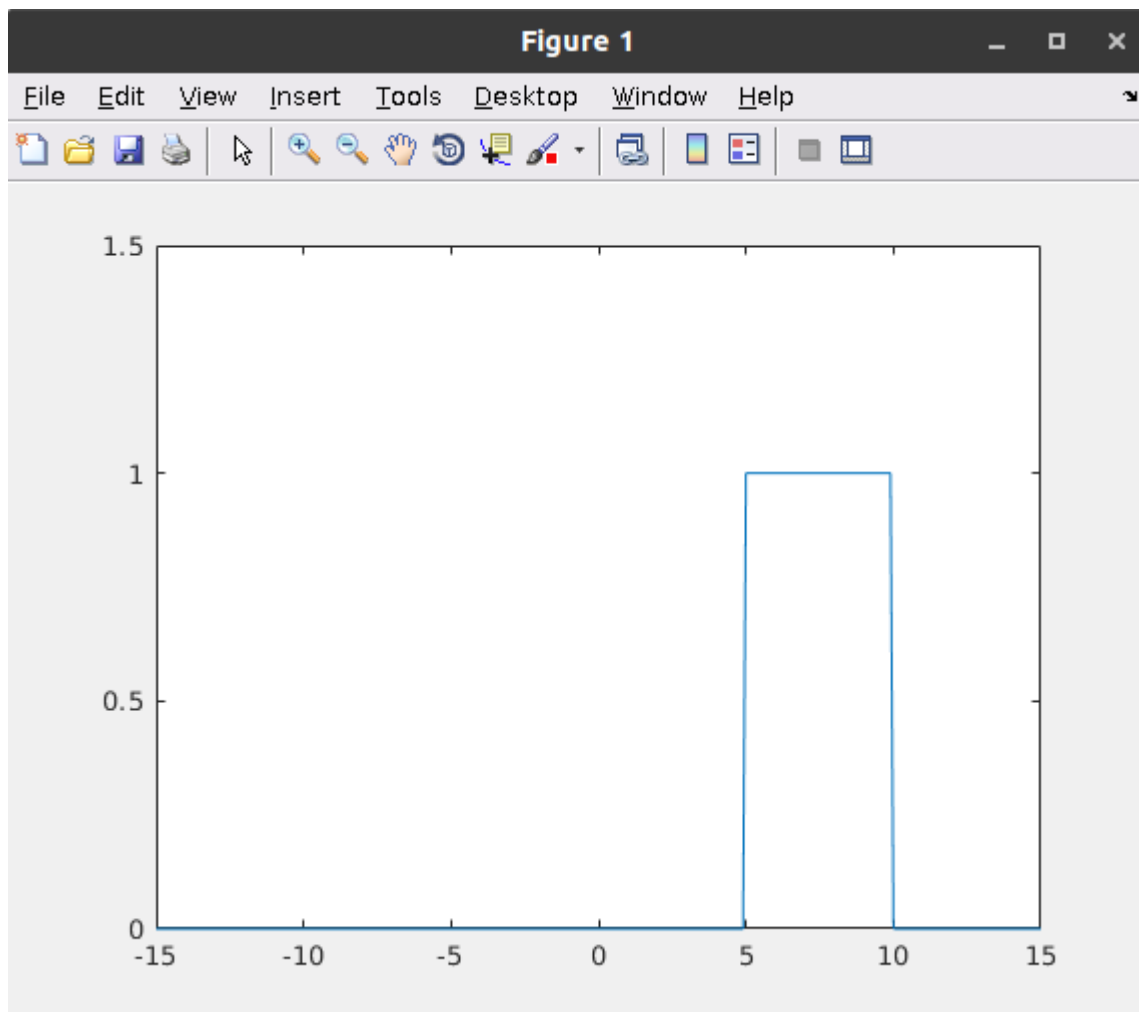
unit.m:

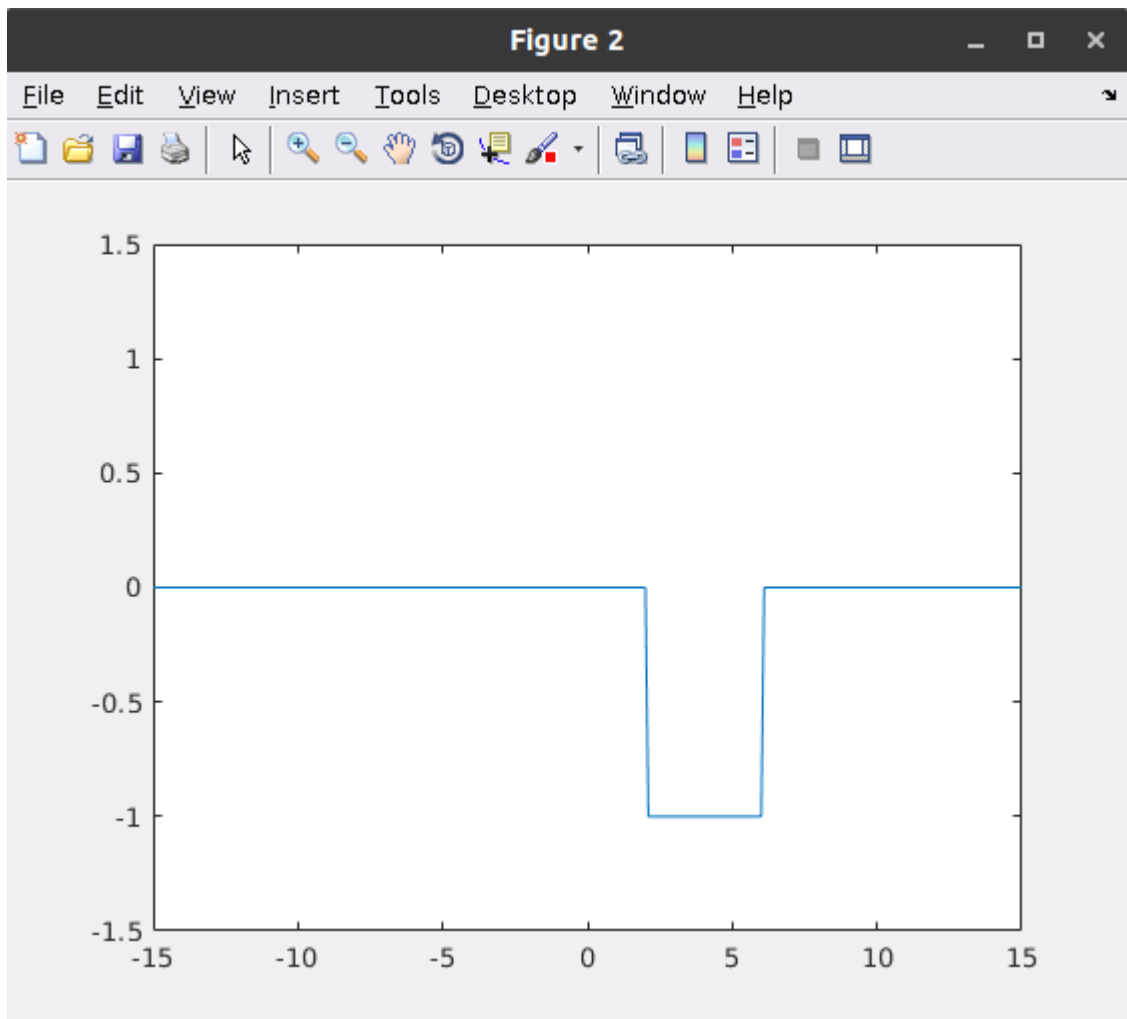
```
function u=unit(t)
%unit step function
u=zeros(size(t)); %New array with all zeros with size of x
u(t>=0)=1;
end
```

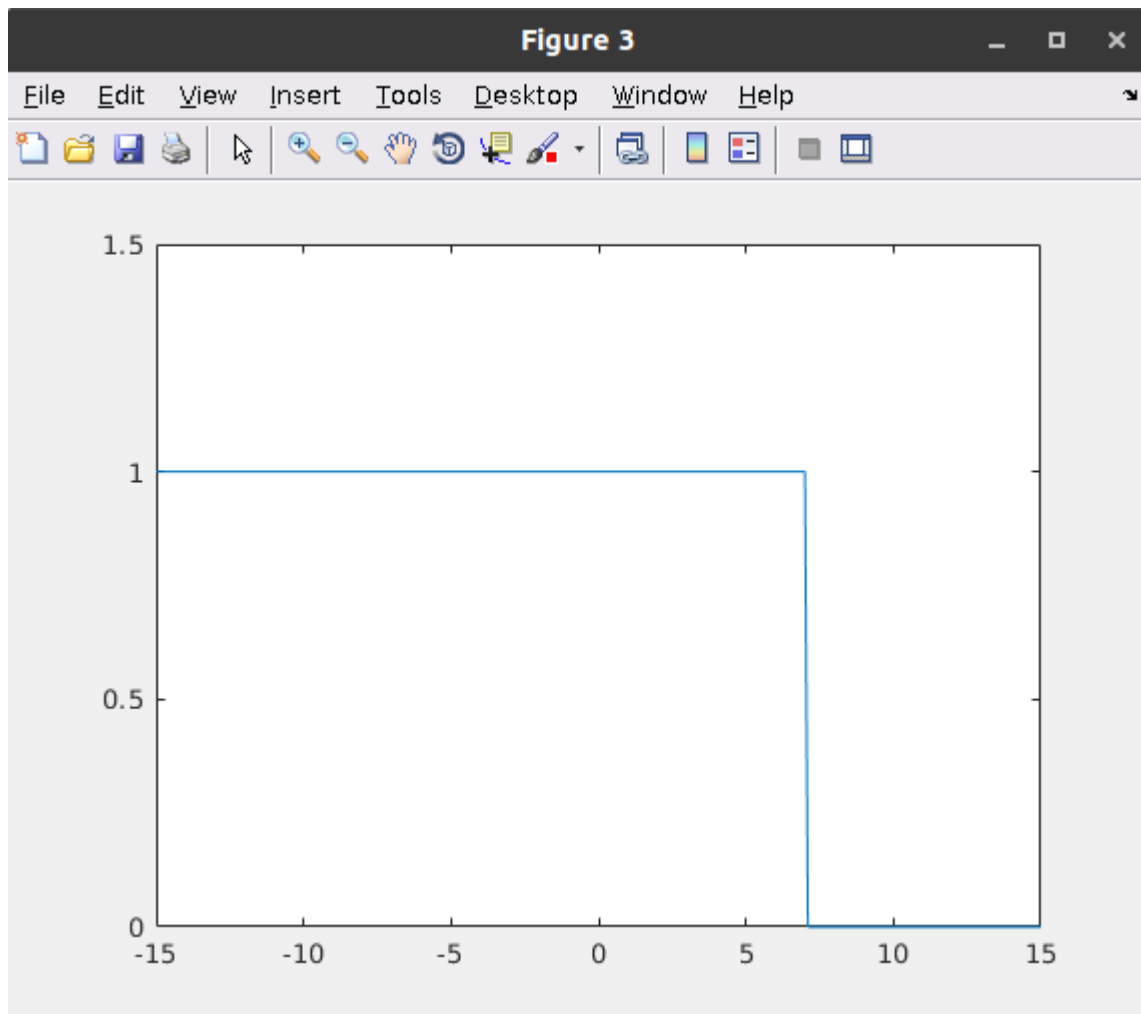
Input Code :

```
t=[-15:0.1:15];  
  
figure(1);  
plot(t,unit(t-5)-unit(t-10));  
ylim([0,1.5]);  
  
figure(2);  
plot(t,unit(2-t)-unit(6-t));  
ylim([-1.5,1.5]);  
  
figure(3);  
plot(t,unit(7-t));  
ylim([0,1.5]);
```

Outputs:



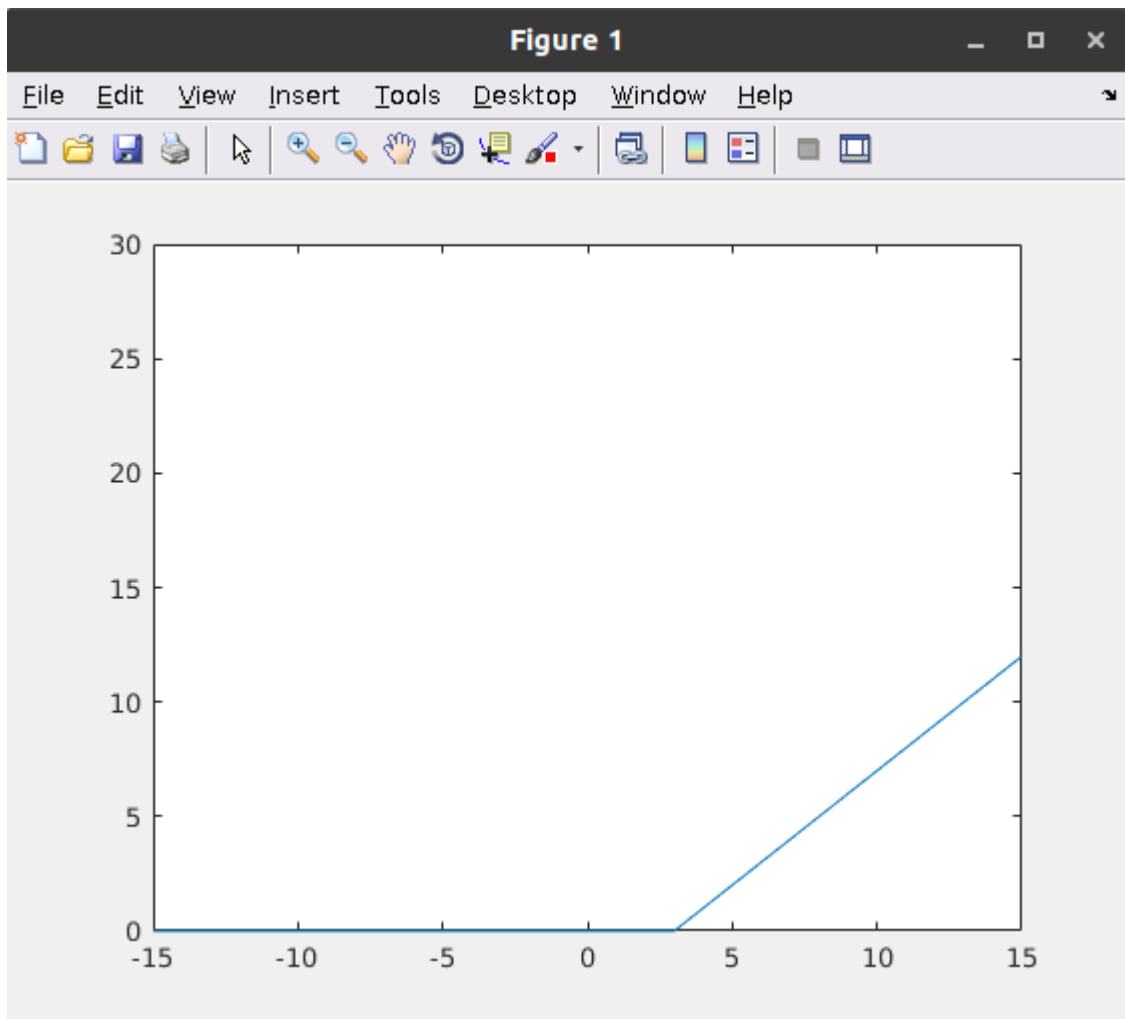


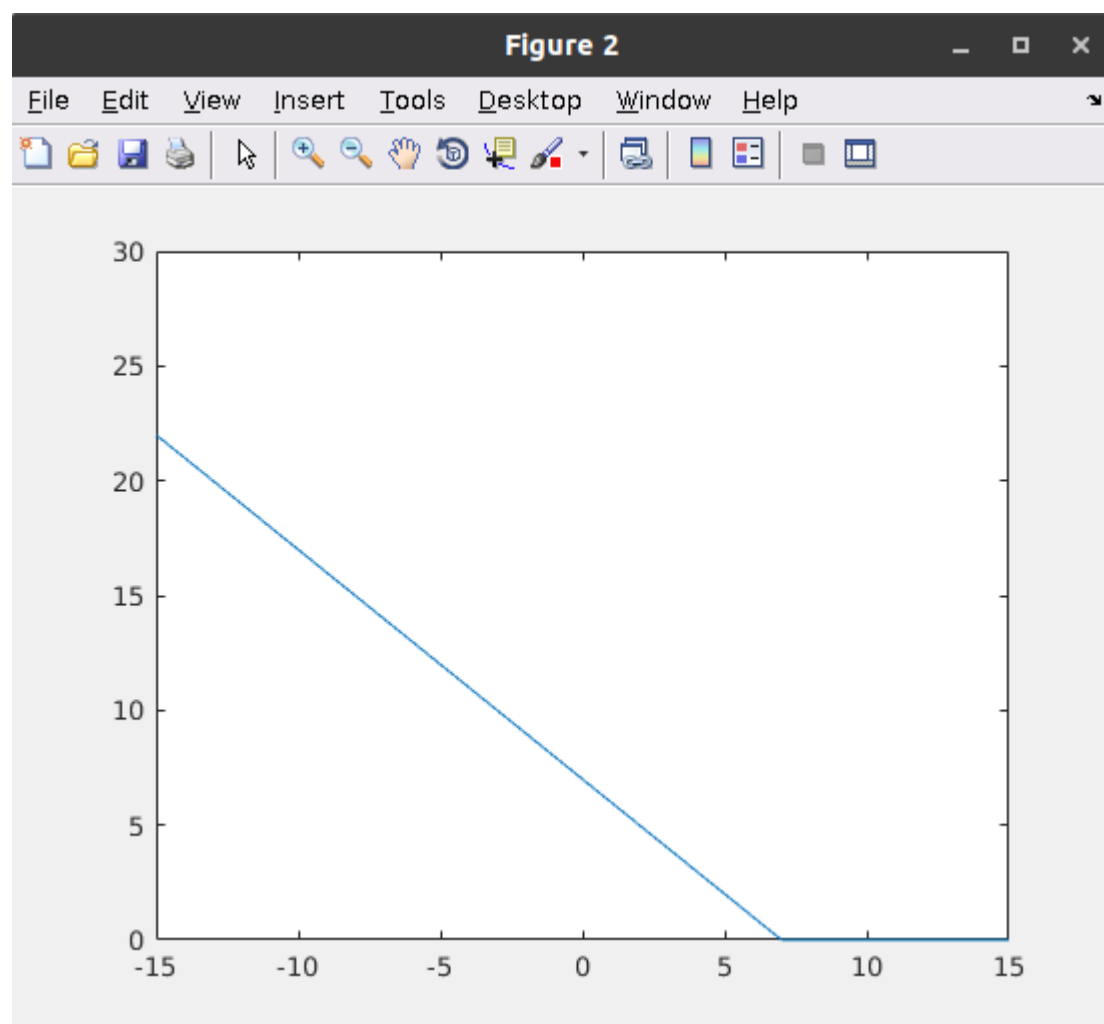


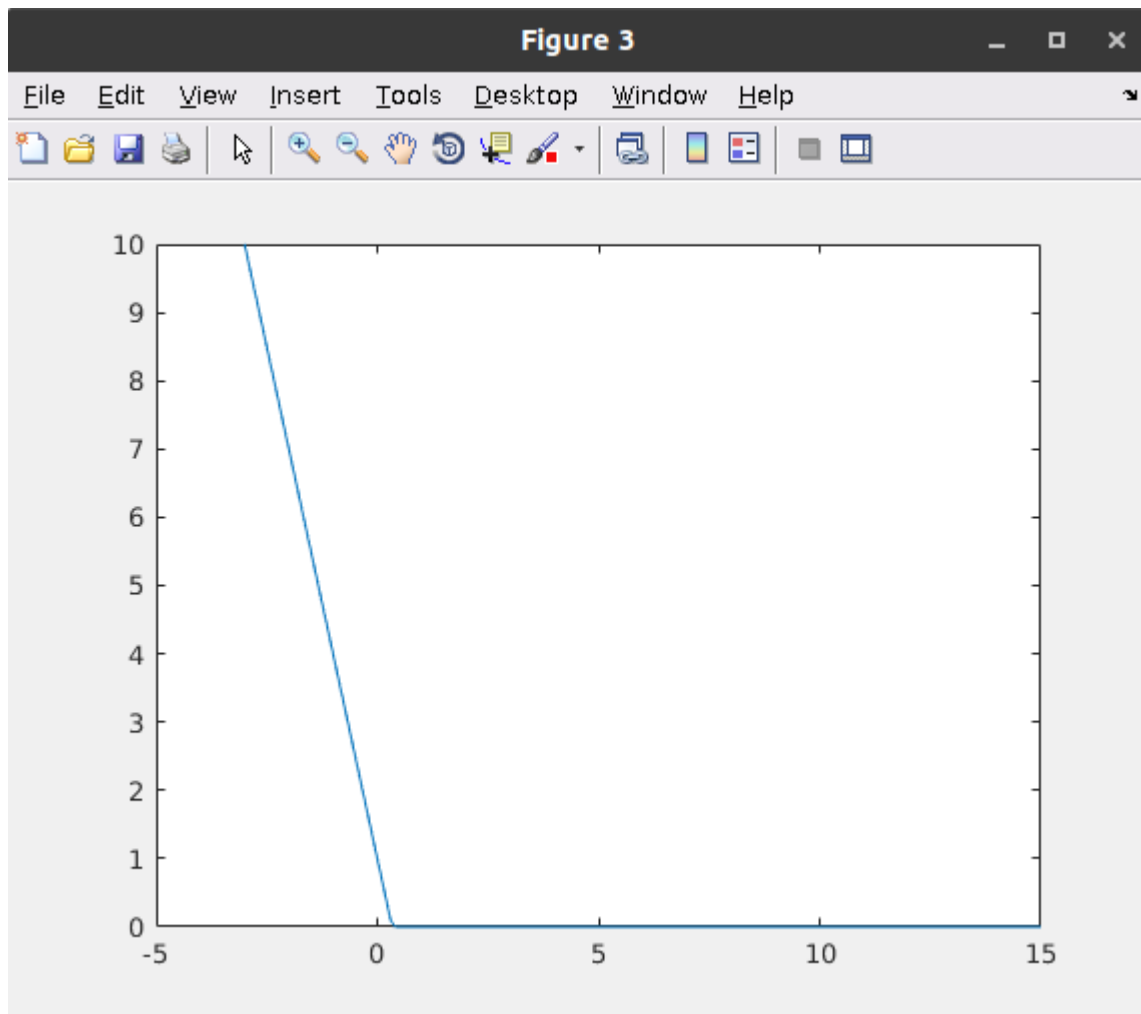
Answer 2

```
t=[-15:0.1:15];  
  
figure(1);  
plot(t,ramp(t-3));  
ylim([0,30]);  
  
figure(2);  
plot(t,ramp(7-t));  
ylim([0,30]);  
  
figure(3);  
plot(t,ramp(1-3*t));  
ylim([0,10]);
```

Output:





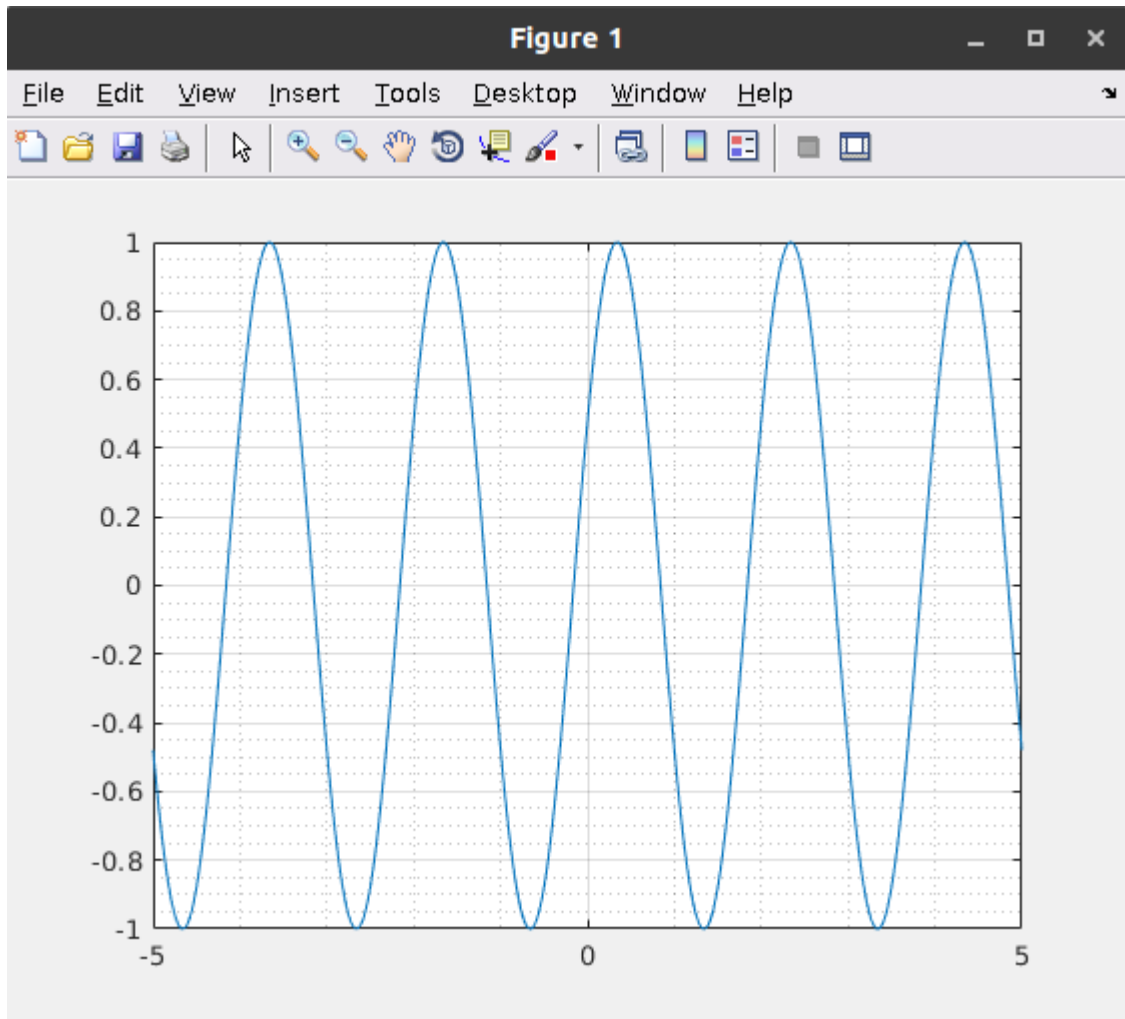


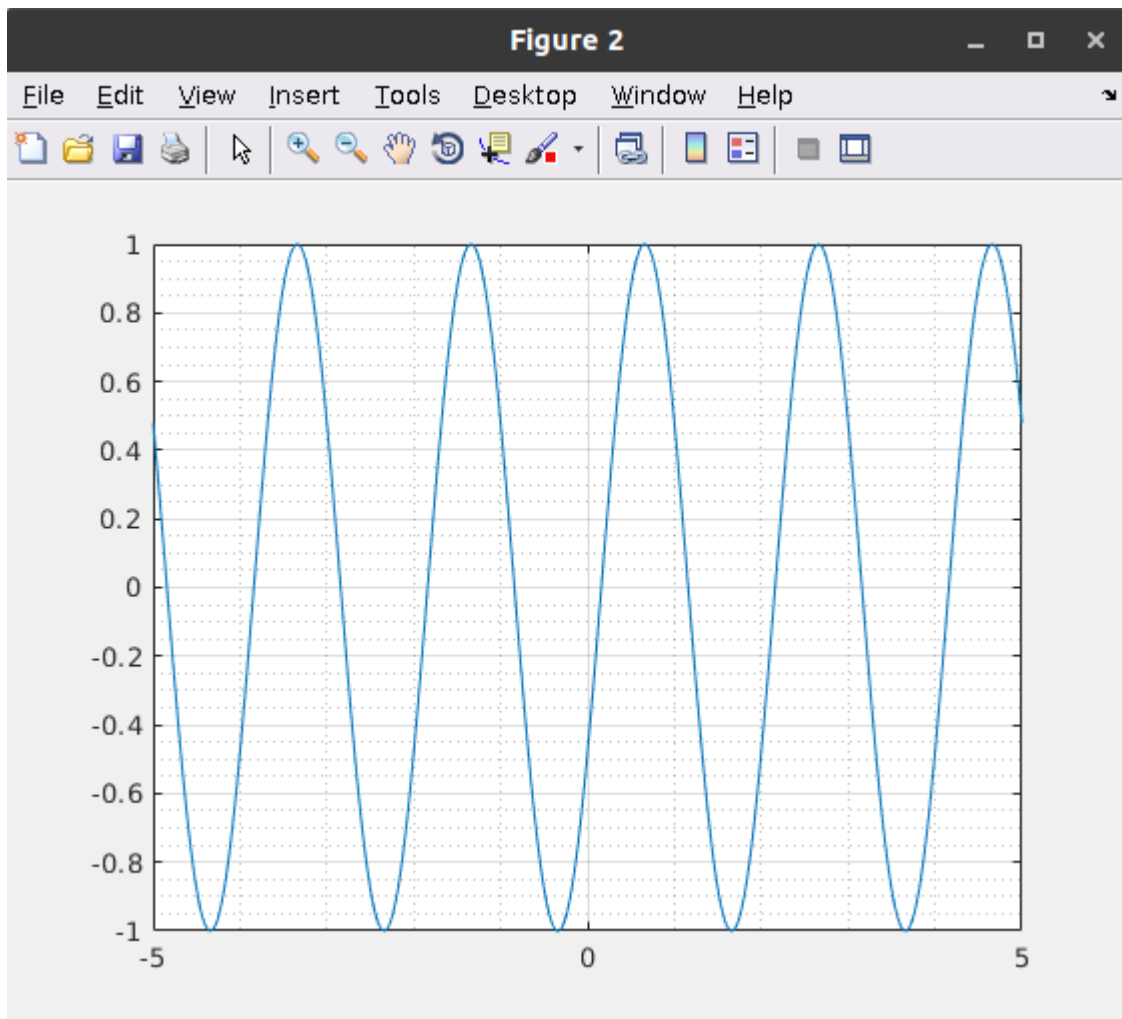
Answer 3

Input:

```
omega0=pi;  
t0=0.5;  
t=[-5:0.01:5];  
  
figure(1);  
plot(t,sin(t.*omega0+t0));  
grid on;  
grid minor;  
  
figure(2);  
plot(t,sin(t.*omega0-t0));  
grid on;  
grid minor;
```

Outputs:





Answer 4:

Inputs:

- q6_x.m:

```
function x=q6_x(t)
x=zeros(size(t));
x(t<0)=0;
x(0<=t)=t(0<=t);
x(1<=t)=2-t(1<=t);
x(3<=t)=t(3<=t)-4;
x(5<=t)=1;
end
```

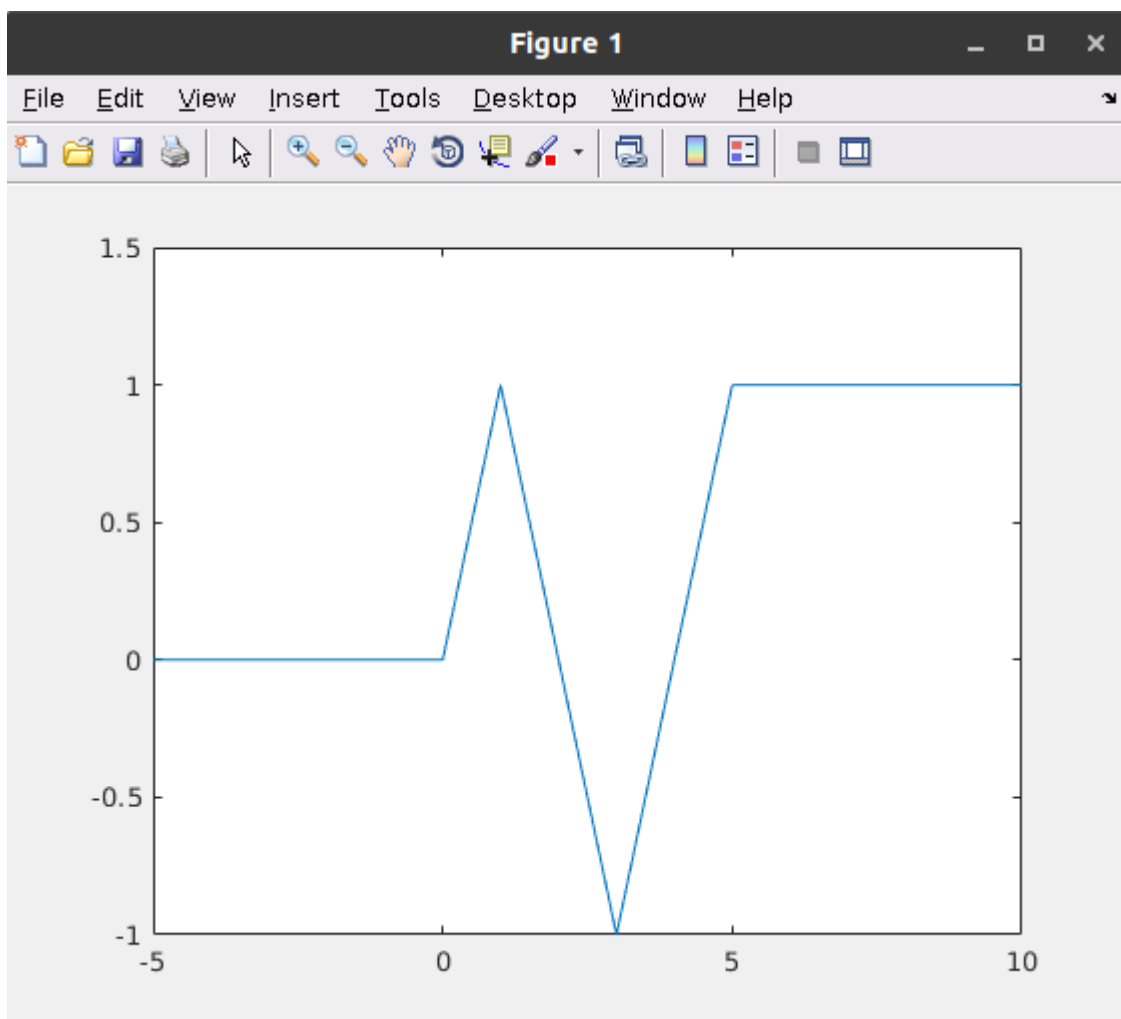
- Main:

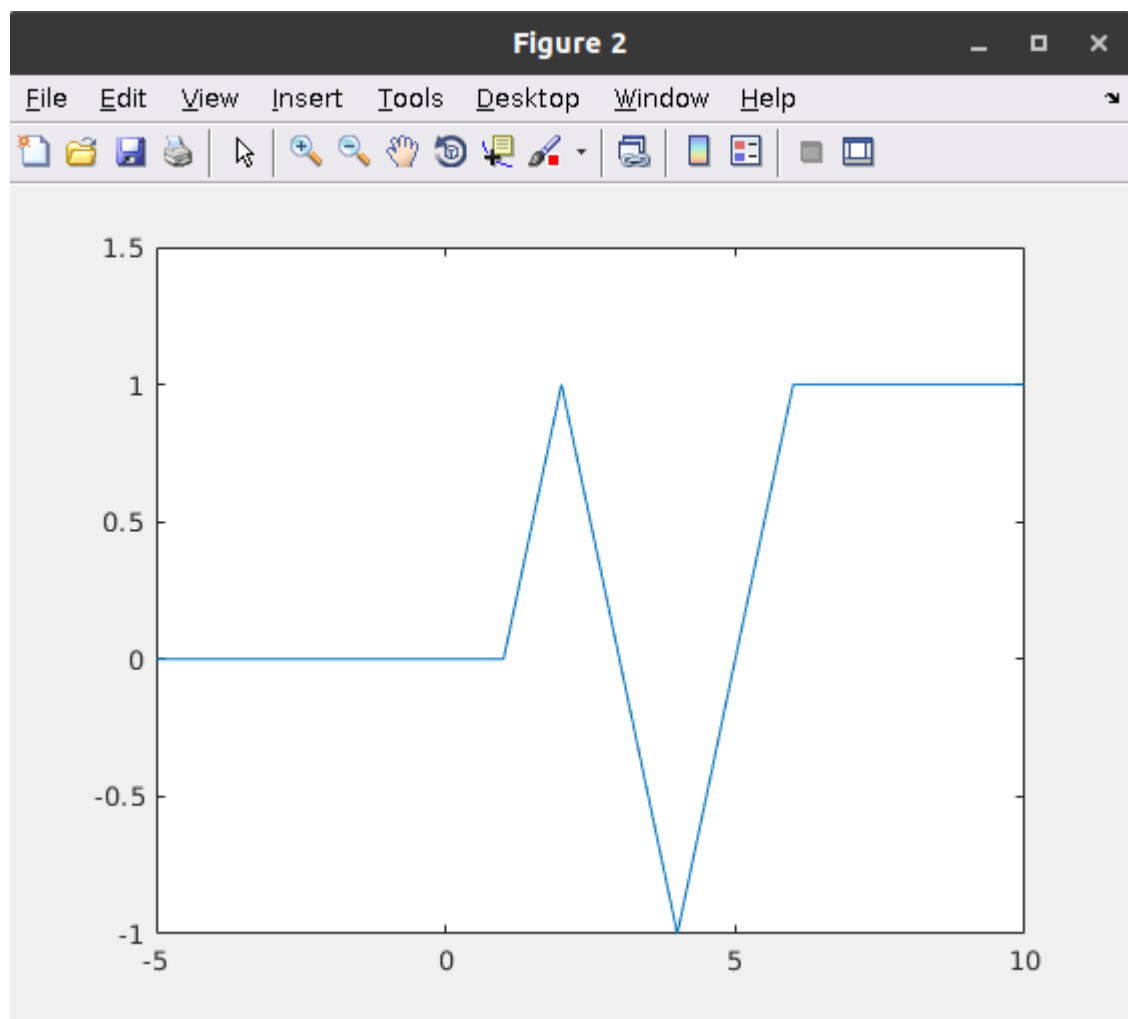
```
t=[-5:0.1:10];

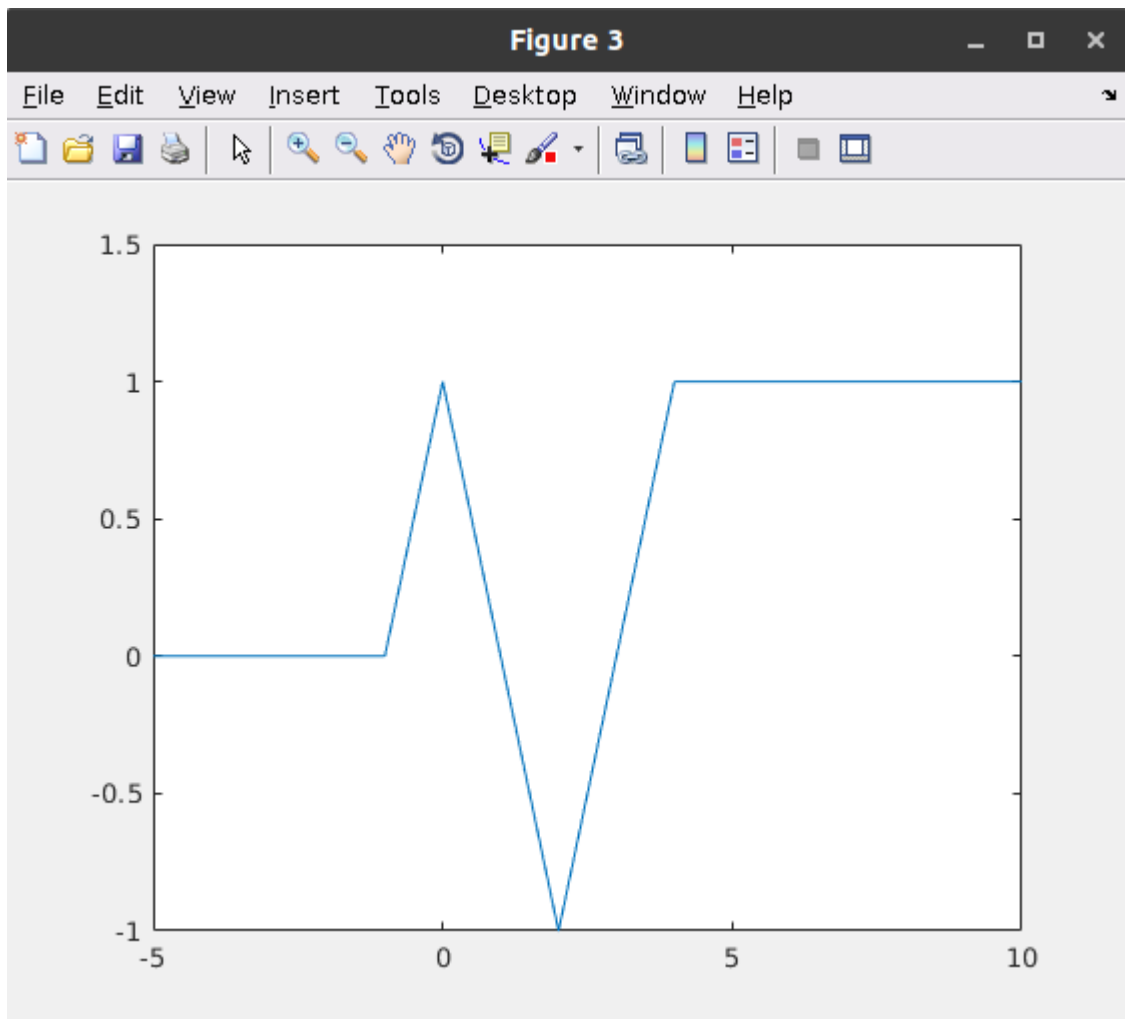
figure(1);
plot(t,q6_x(t));
ylim([-1,1.5]);
```

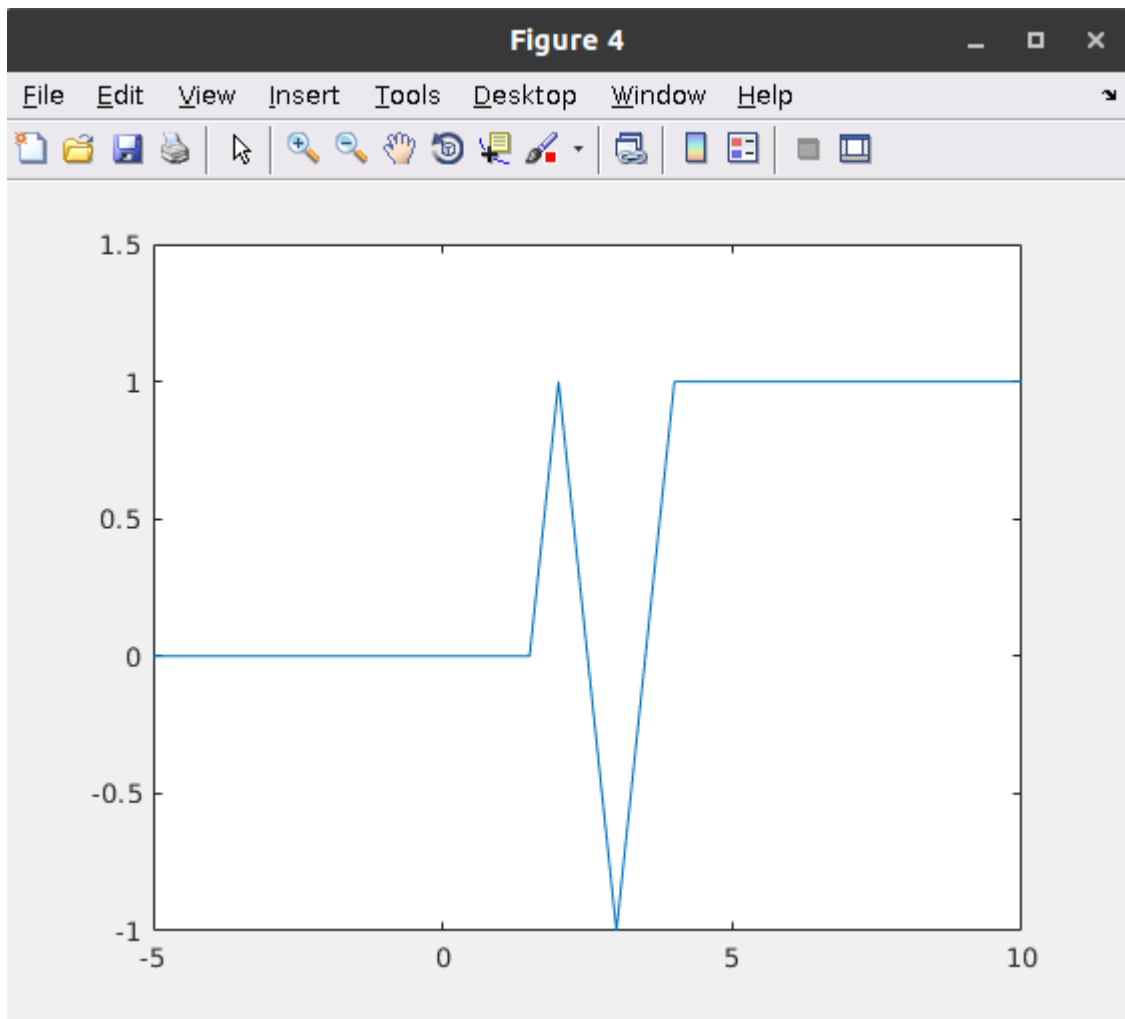
```
figure(2);  
plot(t,q6_x(t-1));  
ylim([-1,1.5]);  
  
figure(3);  
plot(t,q6_x(t+1));  
ylim([-1,1.5]);  
  
figure(4);  
plot(t,q6_x(2*t-3));  
ylim([-1,1.5]);  
  
figure(5);  
plot(t,q6_x(1-2*t));  
ylim([-1,1.5]);
```

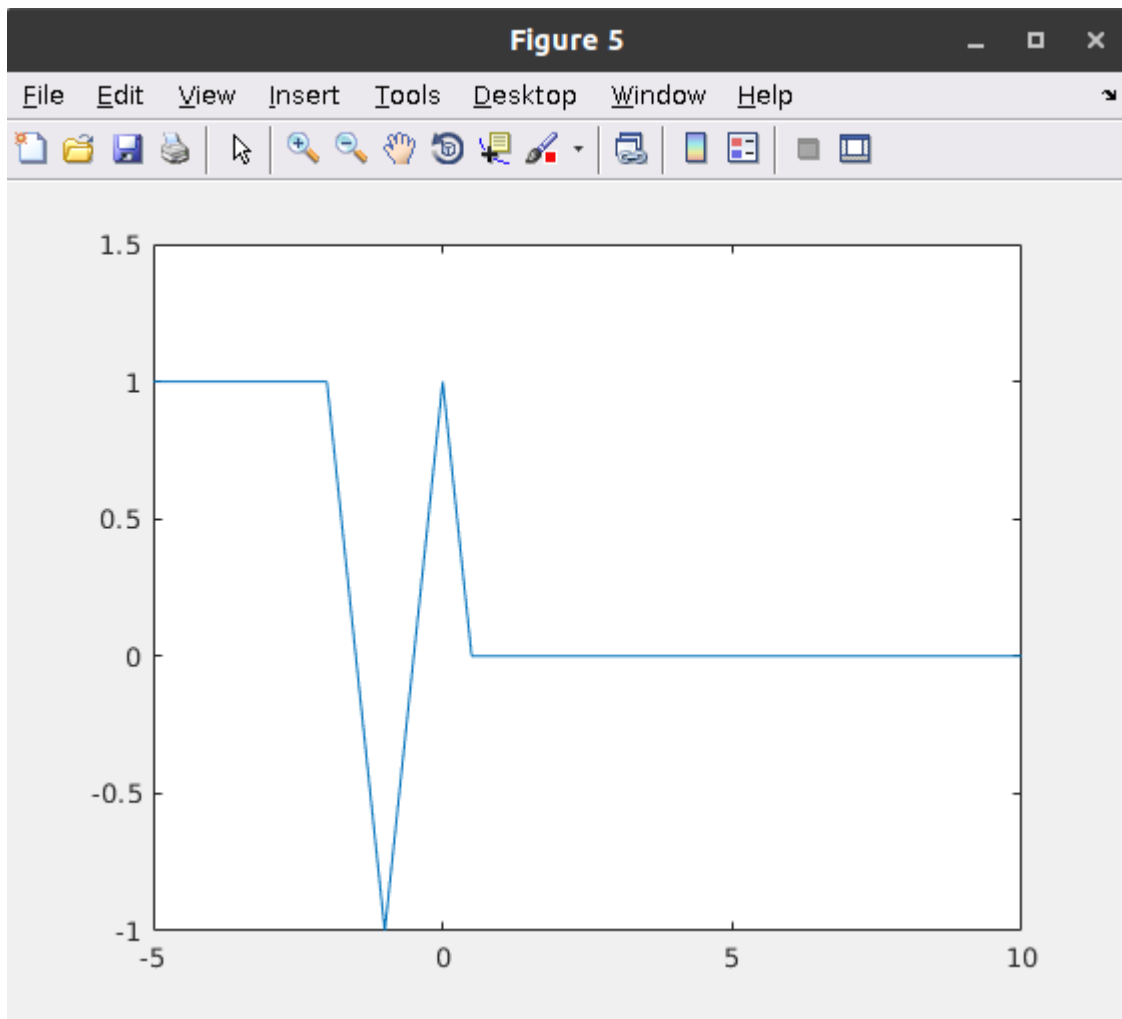
Outputs:











Answer 5

Inputs:

q7_x.m:

```
function x=q7_x(n)
x=zeros(size(n));
x(n==0)=1;
x(n==1)=2;
x(n==2)=3;
x(n==3)=8;
x(n==4)=9;
end
```

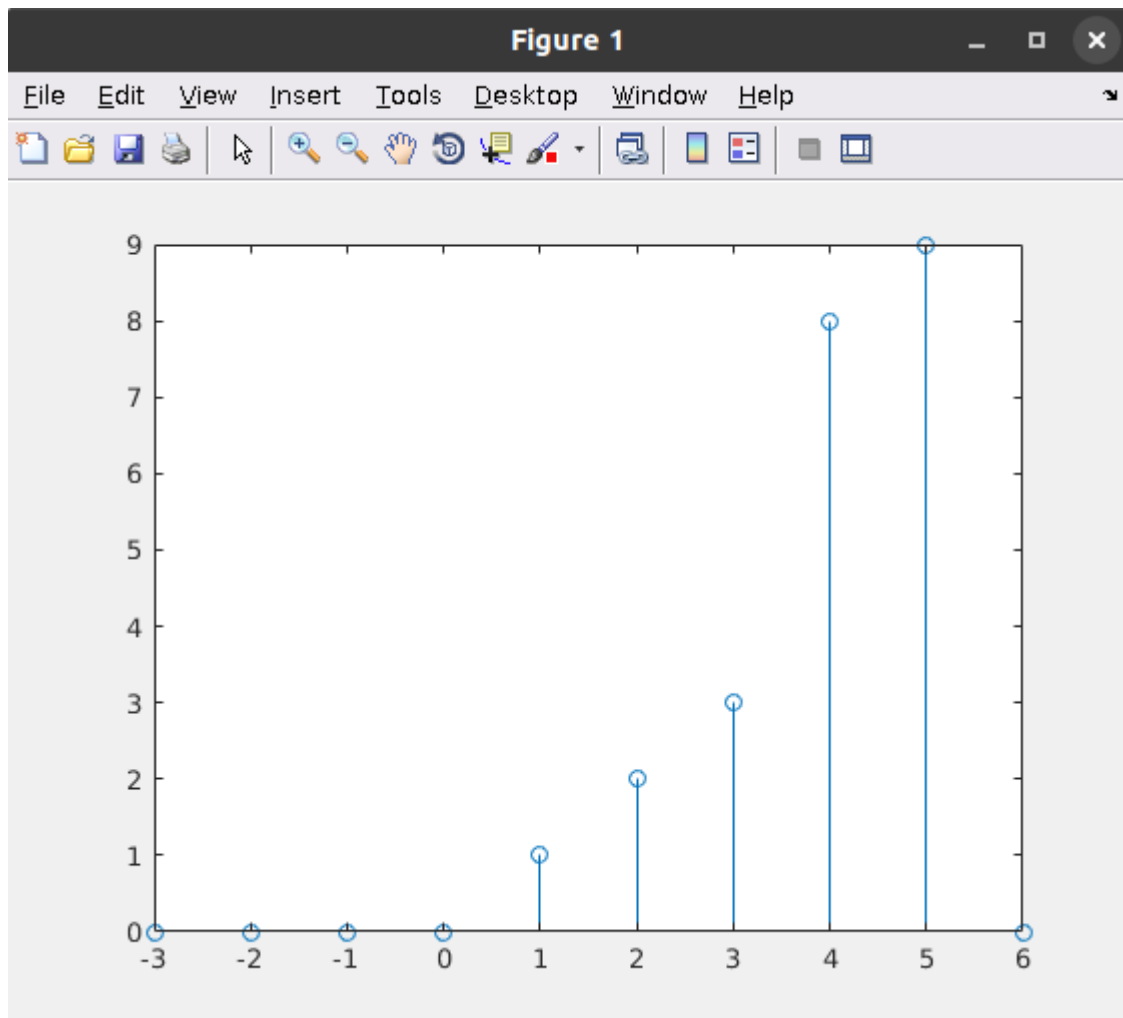
Main:

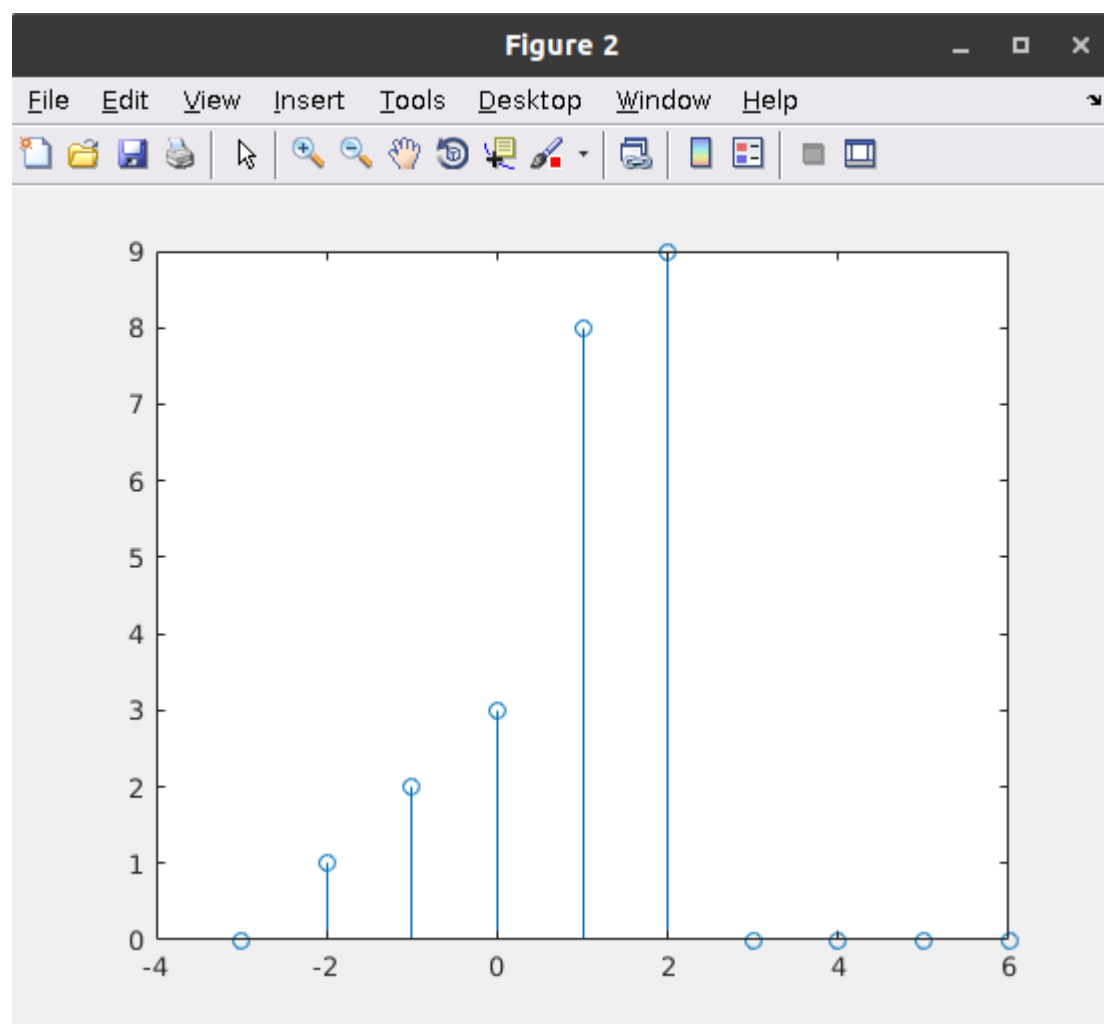
```
n=[-3:6];

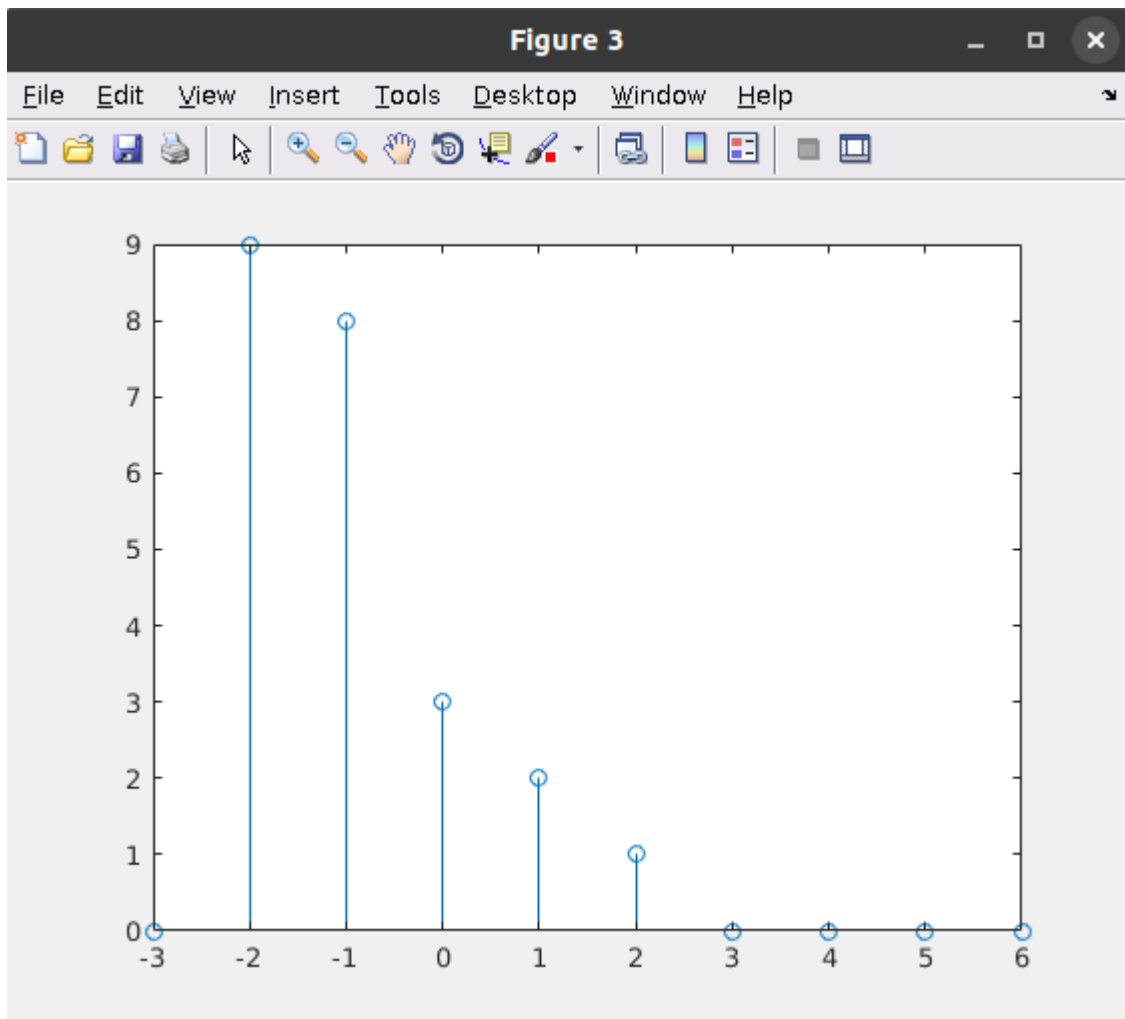
figure(1);
stem(n,q7_x(n-1));
```

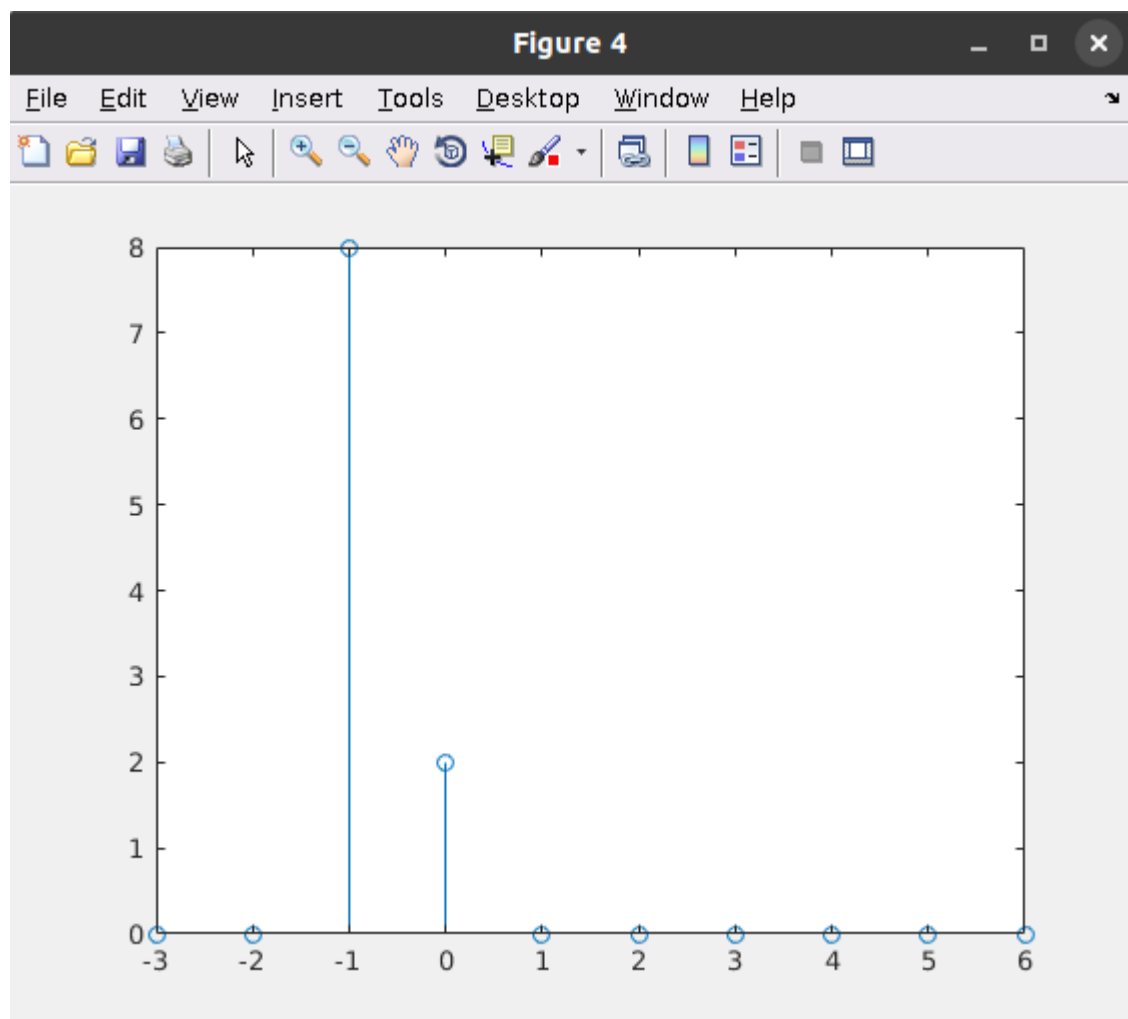
```
figure(2);  
stem(n,q7_x(n+2));  
  
figure(3);  
stem(n,q7_x(2-n));  
  
figure(4);  
stem(n,q7_x(1-2*n));  
  
figure(5);  
stem(n,q7_x(2*n+3));
```

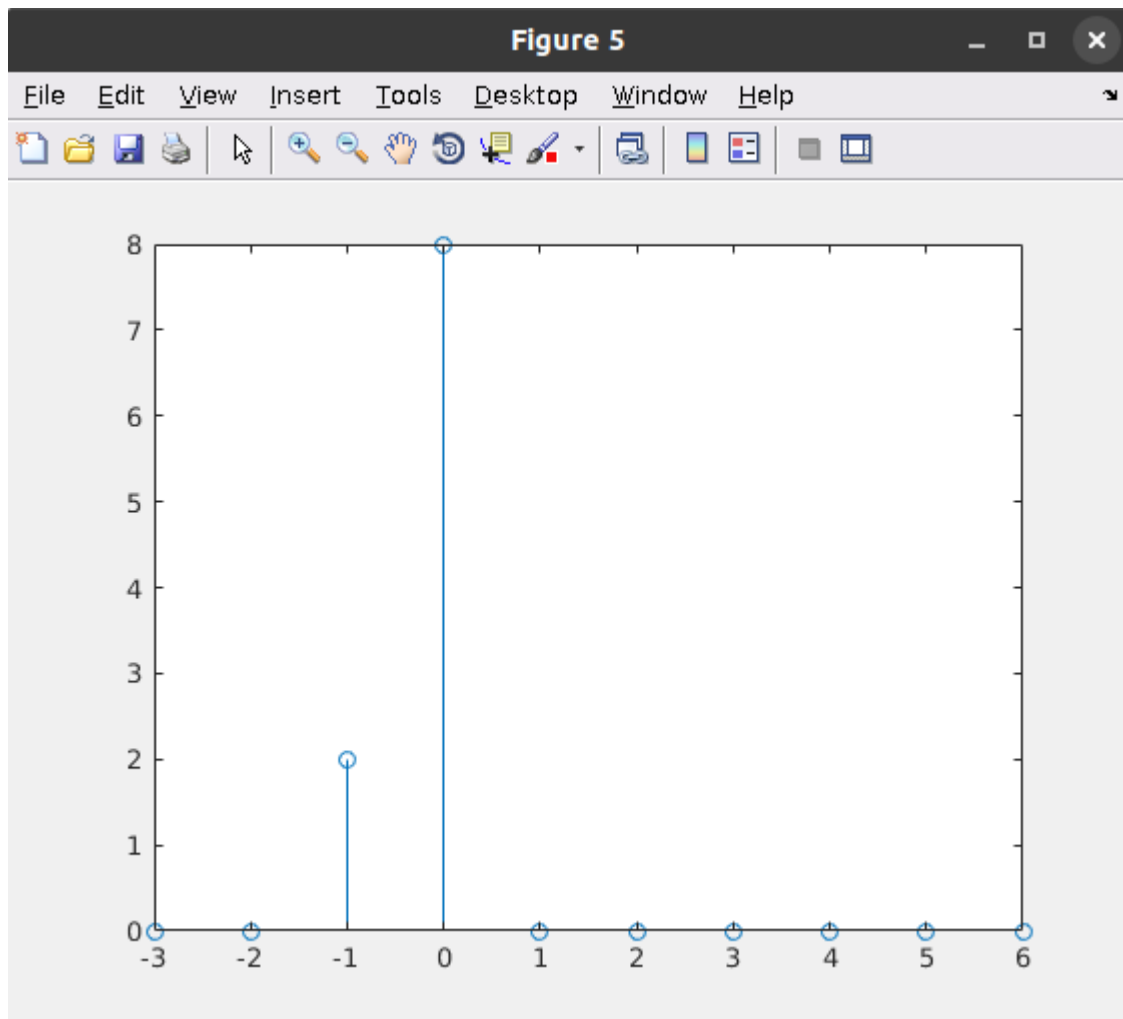
Outputs:











Section C

Inputs:

q8_x.m:

```
function x=q8_x(t)
x=zeros(size(t));
x(-1<t)=1+t*(-1<t);
x(0<t)=1-t(0<t);
x(1<=t)=0;
end
```

q8_y.m:


```

function y=q8_y(t)
k=1;
for i=t
    j=i+1;
    j=j/2;
    j=j-floor(j);
    j=j*2;
    j=j-1;
    n=q8_x(j:j);
    y(k)=n(1);
    k=k+1;
end
end

```

Main

```

t=[-4:0.01:4];

figure(1);
plot(t,q8_x(t));
ylim([-0.5,1.5]);

figure(2);
plot(t,q8_y(t));
ylim([-0.5,1.5]);

```

Outputs:

