电子科技大学 格拉斯哥 学院

___Glasgow____ **of UESTC**

标 准 实 验 报 告

Lab Report

（实验）课程名称: 信号与系统

(LAB) Course Name: SIGNAL AND SYSTEM

电子科技大学教务处制表

Glasgow College，UESTC
Lab Report

学生姓名 Student Name：FENG Jiayi

学　号 Student No.：2016200103020

指导教师 Instructor：　SHI Chuang

实验地点 Location：　Main Building A1-305

实验时间 Date：2018/11/13

一、　实验室名称 Laboratory name：virtual machine laboratory

二、　实验项目名称 Project name：SIGNAL AND SYSTEM LAB

三、　实验学时 Lab hours：4×4=16

四、　实验原理 Theoretical background：

The concept of convolution and Fourier series in both continuous and discrete function are needed. Besides, the grammar or the regulation of the MATLAB are also needed as the theoretical knowledge base.

五、　实验目的 Objective：

Get familiar with the MATLAB in programming process.

Calculate the convolution, frequency response and system

output by MATLAB's functions.

Learn how to draw the signal waveform with functions like stem

六、 实验内容 **Description：**

Several questions related to convolution, frequency response and system output are required in this lab. Moreover, waveform and related properties are also the content of this lab.

七、 实验器材（设备、元器件）**Required instruments：**

A computer with the MATLAB software

八、 实验步骤 **Procedures：**

Get familiar with the MATLAB software

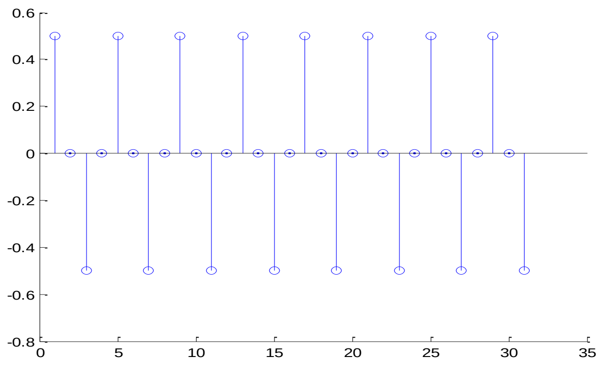
Answer the required questions with MATLAB programming

Draw the graph of these questions (if required)

九、 实验数据及结果分析 **Analysis of Lab data & result：**

1.2d

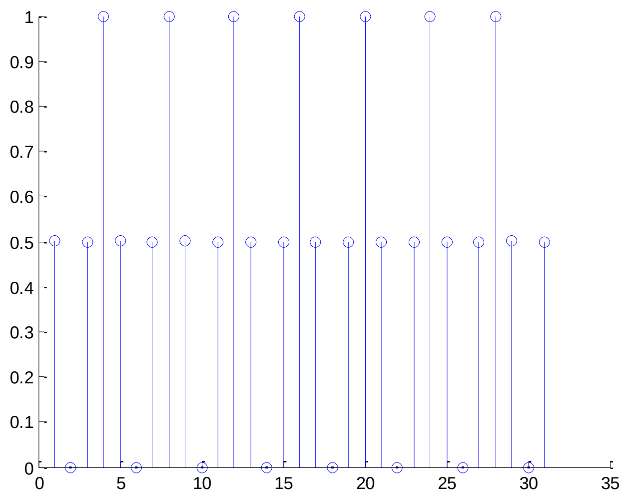
```
n=[1:31];
x1n=sin(pi*n/4).*cos(pi*n/4);
stem(n,x1n);
```



n=[1:31];

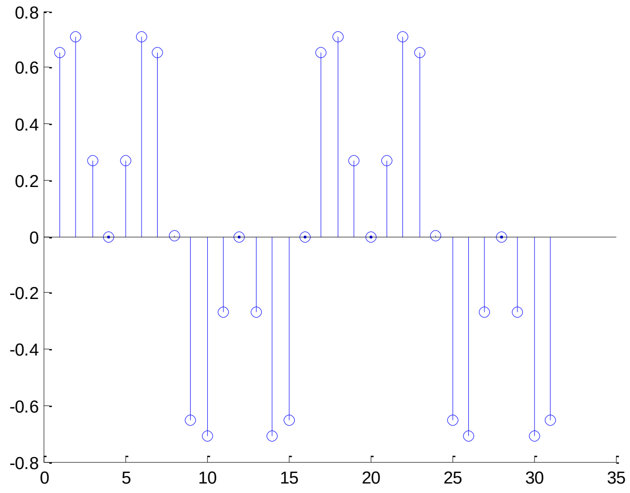
x2n=cos(pi*n/4).*cos(pi*n/4);

stem(n,x2n);

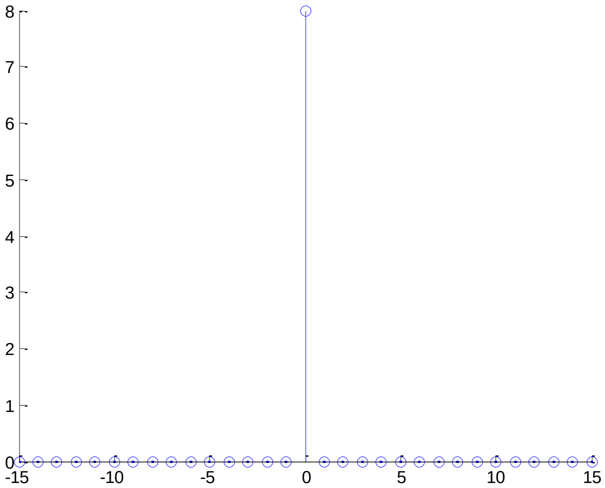


n=[1:31];

```
x3n=sin(pi*n/4).*cos(pi*n/8);

stem(n,x3n);
```

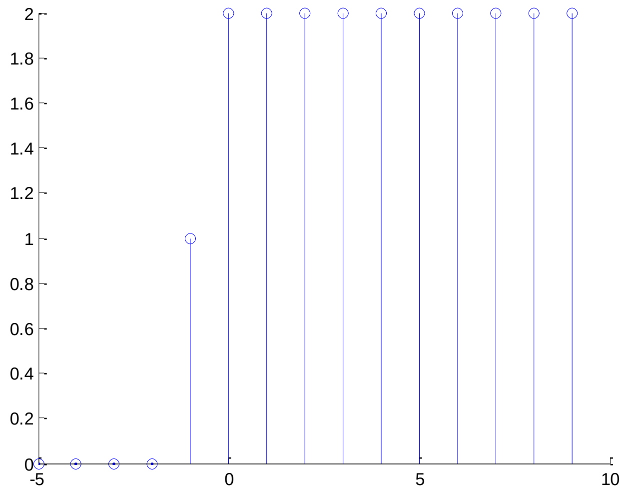



```
1.4 a) n=[-15:15];

x1n=[zeros(1,15) 1 zeros(1,15) ]

x2n=[zeros(1,15) 2 zeros(1,15) ];

y1n=sin(pi*n/2).*x1n;

y2n=sin(pi*n/2).*x2n;

x3n=5*x1n+4*x2n;

y3n=5*y1n+4*x2n;

stem(n,y3n);
```

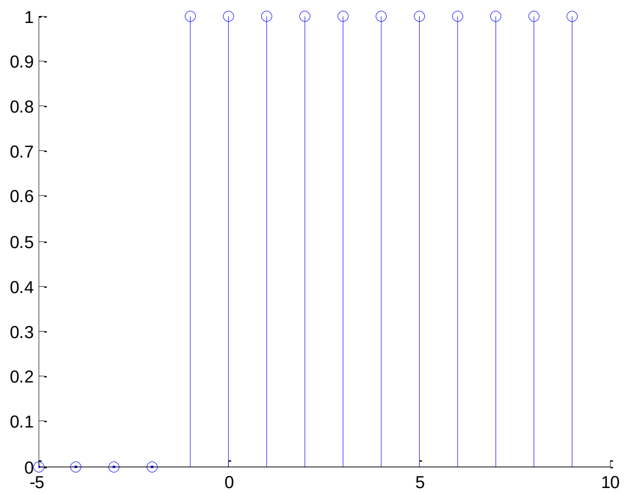


1.4 b)

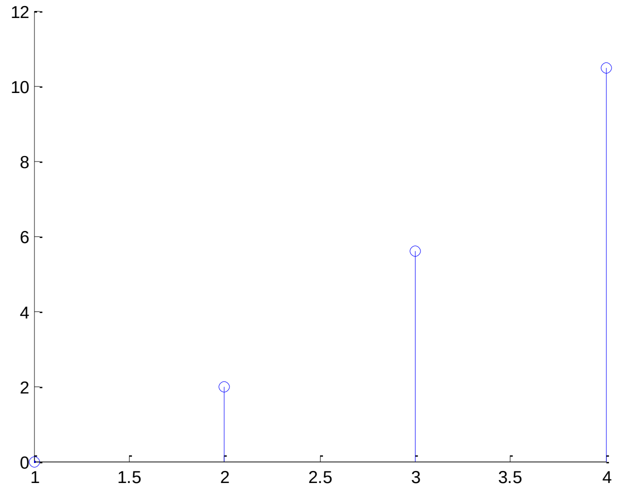
```
n=[-5:9];

xn=[zeros(1,5) 1 ones(1,9)]

xn1=[zeros(1,4) 1 ones(1,10)]

yn=xn+xn1;

stem(n,yn);
```




```
x1=[0 0 0 0 0 1 1 1 1 1 1 1 1 1 1];
x2=[0 0 0 0 1 1 1 1 1 1 1 1 1 1 1];
n=[-5:9];
y=x1+x2;
stem(n,y);
stem(n,x1);
stem(n,x2);
hold;
```




```
a=[1 -0.8];

b=[0 2];

x=[1:4];

y=filter(b,a,x);

stem(x,y);
```



x=[1 1 1 1 1 1 0 0 0 0 0];

t=[0:5];

y=filter(t,1,x);

stem(y);

2.2 a)
b1=[0.5 1 2];
a1=[1 0 0];
2.2 b)
b2=[2 0];
a2=[1 -0.8];
2.2 c)
b3=[0 2];
a3=[1 -0.8];
2.2 d)

b1=[0.5 1 2];
a1=[1 0 0];
b2=[2 0];
a2=[1 -0.8];
b3=[0 2];
a3=[1 -0.8];
x=[1 2 3 4];
y1=filter(b1,a1,x)
y2=filter(b2,a2,x)
y3=filter(b3,a3,x)

```
>> b1=[0.5 1 2];
a1=[1 0 0];
b2=[2 0];
a2=[1 -0.8];
b3=[0 2];
a3=[1 -0.8];
x=[1 2 3 4];
y1=filter(b1,a1,x)
y2=filter(b2,a2,x)
y3=filter(b3,a3,x)

y1 =

    0.5000    2.0000    5.5000    9.0000


y2 =

    2.0000    5.6000   10.4800   16.3840


y3 =

         0    2.0000    5.6000   10.4800

``
```

3.1 a)

b1=[2 0 -1];

a1=[1 -0.8 0];

3.1 b)

b1=[2 0 -1];

a1=[1 -0.8 0];

[H1 Omega1]=freqz(b1,a1,4)

```
> b1=[2 0 -1];
> a1=[1 -0.8 0];
> [H1 Omega1]=freqz(b1,a1,4)

I1 =

   5.0000
   2.8200 - 1.3705i
   1.8293 - 1.4634i
   0.9258 - 0.9732i


mega1 =

        0
   0.7854
   1.5708
   2.3562
```

3.1 c)

b1=[2 0 -1];

a1=[1 -0.8 0];

[H2

Omega2]=freqz(b1,a1,4,'whole')

```
>> [H2 Omega2]=freqz(b1,a1,4,'whole')

H2 =

   5.0000
   1.8293 - 1.4634i
   0.5556
   1.8293 + 1.4634i


Omega2 =

        0
   1.5708
   3.1416
   4.7124

>>
```

十、 实验结论 Lab conclusion：

Results are shown above.

十一、总结及心得体会 Summary and comments：

Only by knowing the theoretical knowledge of the signal and system very well can we answer the related questions in MATLAB. There are many cases when I can answer the question in paper, but cannot in MATLAB, not to mention several questions I cannot even understand…

For example, convolution can be calculated by my hands, but I never think of calculating it with MATLAB’s composing method. So knowing the theoretical knowledge of the signal and system very well is very important in the lab, and after that programming grammar in MATLAB can have effect.

十二、对本实验过程及方法、手段的改进建议 Suggestion for this lab：

More time are needed in MATLAB so that we will not be trapped by grammar mistakes of programming.

报告评分 Score：

指导教师签字 Instructor：