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：2018/11/19**

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 state, and the energy of continuous Fourier series. Moreover, The MATLAB's function lsim was introduced to this lab.

五、 实验目的 **Objective：**

Review those learned theoretical knowledge in MATLAB.

Calculate the function of lsim, the energy of continuous Fourier series, and the frequency feedback in a LTI system.

The function-Plotyy is needed for figures.

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：**

Review the related theoretical knowledge in advance, for instance, getting familiar with the formula.

Answer the required questions with MATLAB ways, which means state or present the known condition in MATLAB ways and then calculated by the MATLAB.

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

```
3.3 a)
b1=[1 -2];
a1=[1 2];

3.3 b)
b2=[0 3];
a2=[1 -0.3];

3.3 c)
b3=[2 0];
a3=[1 0.8];
```

3.3 d)

```
b1=[1 -2];
a1=[1 2];
b2=[0 3];
a2=[1 -0.3];
b3=[2 0];
a3=[1 0.8];
t=0:0.1:0.5;
x=cos(t);
y1=lsim(b1,a1,x,t)'
y2=lsim(b2,a2,x,t)'
y3=lsim(b3,a3,x,t)'
```

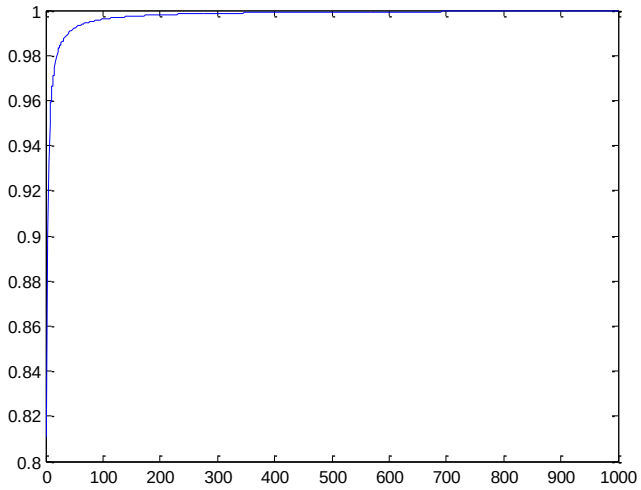
```
The element type "name" must be terminated by the matching end-tag "</name>".
Could not parse the file: c:\matlab7\toolbox\ccslink\ccslink\info.xml
>> b1=[1 -2];
a1=[1 2];
>> b2=[0 3];
a2=[1 -0.3];
>> b3=[2 0];
a3=[1 0.8];
>> t=0:0.1:0.5;
>> x=cos(t);
>> y1=lsim(b1,a1,x,t)'

y1 =

    1.0000    0.6334    0.3261    0.0692   -0.1444   -0.3205

>> y2=lsim(b2,a2,x,t)'

y2 =

         0    0.3038    0.6138    0.9272    1.2412    1.5529

>> y3=lsim(b3,a3,x,t)'

y3 =

    2.0000    1.8366    1.6667    1.4910    1.3105    1.1262

>>
```

3.7 a) yt=2s(ϕ/ ω +t)-1

3.7 b)8/Π^2-1/2

3.7 c) (8/Π^2)*(Π^2/6-Π^2/24)=1

3.7 d)

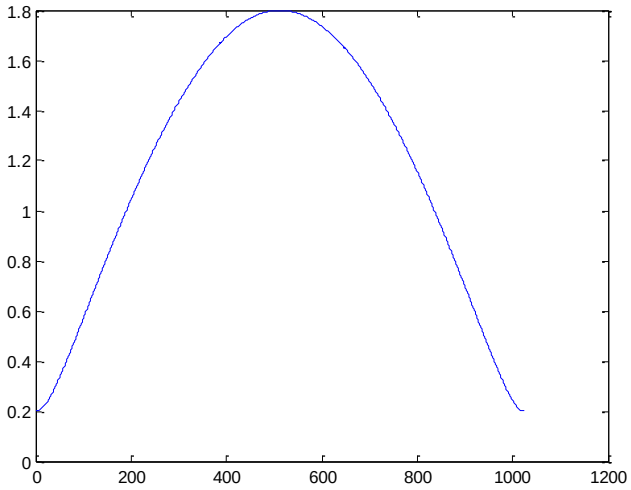


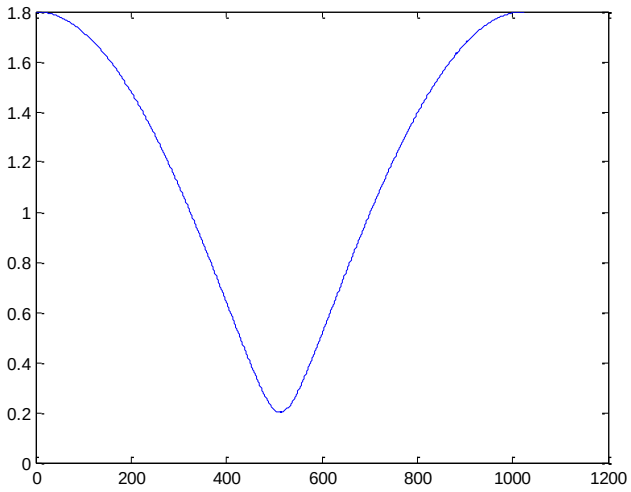
3.8 a)

```
b1=[1 0];
b2=[1 0];
a1=[1 -0.8];
a2=[1 0.8];
```

3.8 b)

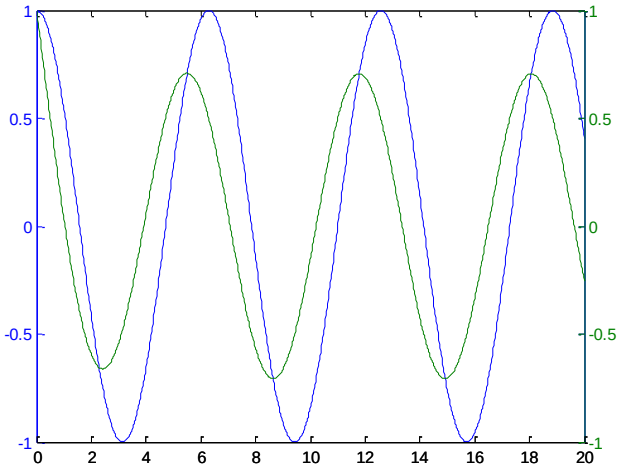
```
b1=[1 0];
b2=[1 0];
a1=[1 -0.8];
a2=[1 0.8];
ak=[0 -1/2 zeros(1,7) 3/4 0 3/4 zeros(1,7) -1/2 0];
xn=real(20*ifft(ak));
y1=filter(b1,a1,xn);
y2=filter(b2,a2,xn);
[H1 Omega]=freqz(a1,b1,1024,'whole');
[H2 Omega]=freqz(a2,b2,1024,'whole');
y11=abs(H1)';
y22=abs(H2)';
n=1:1024;
```


1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
200
400
600
800
1000
1200


1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
200
400
600
800
1000
1200

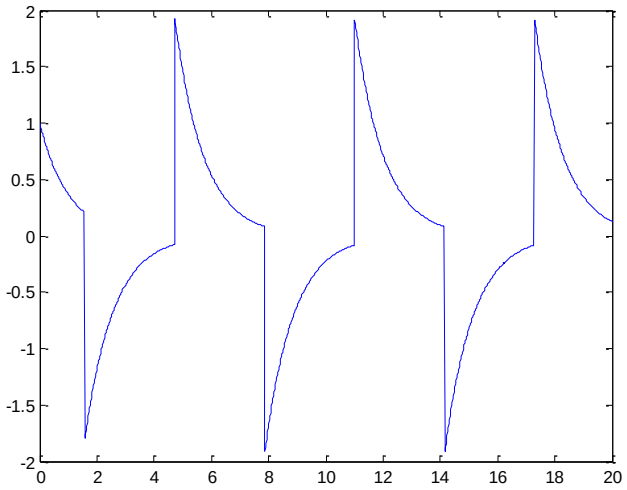
3.9 a)

```
b=[1 0];
a=[1 1];
t=linspace(0,20,1000);
xt=cos(t);
yt=lsim(b,a,xt,t)';
plotyy(t,xt,t,yt);
```



3.9 b)

```
b=[1 0];
a=[1 1];
t=linspace(0,20,1000);
x2=cos(t);
x2(x2>0)=ones(size(x2(x2>0)));
x2(x2<0)=-ones(size(x2(x2<0)));
y2t=lsim(b,a,x2,t);
plot(t,y2t);
```



十、 实验结论 **Lab conclusion：**

Results are shown above.

十一、总结及心得体会 **Summary and comments：**

the theoretical knowledge of the signal and system are reviewed during the lab session, for example, the Fourier series. Besides, the lsim function is introduced, which helps to present known condition in a better way when we encounter the system with linear coefficient differential equation.

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：**