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Lab 5

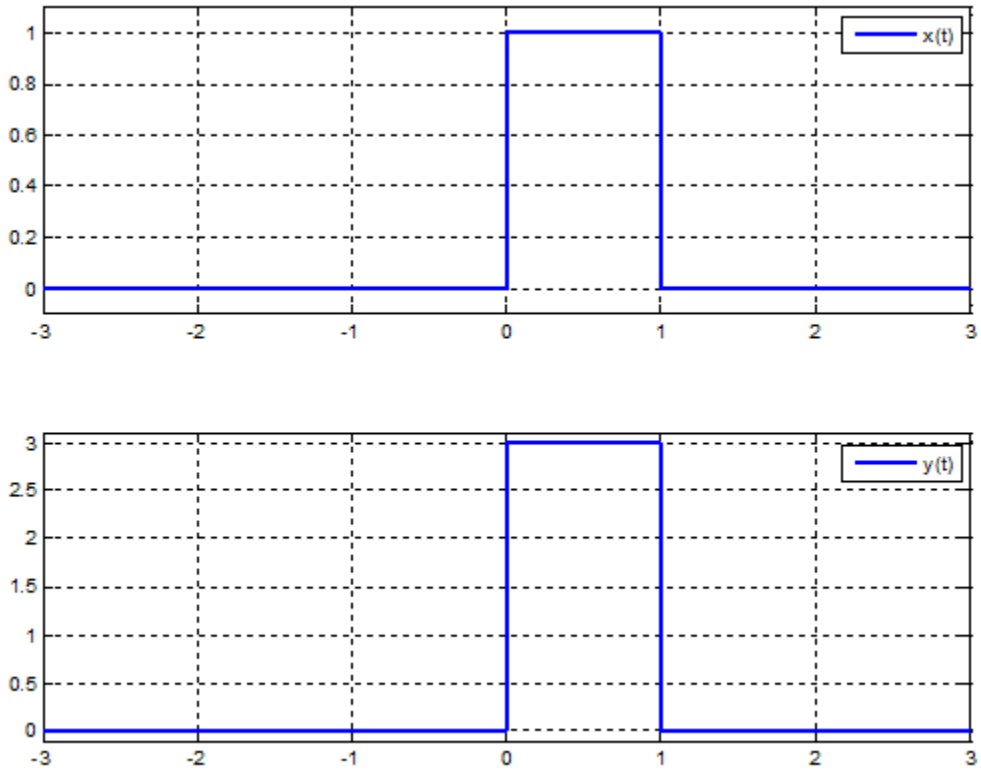
PRE-LAB

Causal and Non-causal Systems:

```
t1=-3:0.1:0;
x1=zeros(size(t1));
t2=0:0.1:1;
x2=ones(size(t2));
t3=1:0.1:3;
x3=zeros(size(t3));
t=[t1 t2 t3];
x=[x1 x2 x3];
subplot(3,1,1)
plot(t,x,'linewidth',2),grid on
ylim([-0.1 1.1]);
legend('x(t)')
subplot(3,1,2)
plot(t-1,x,'linewidth',2),grid on
ylim([-0.1 1.1]);
legend('y_1(t)')
subplot(3,1,3)
plot(t+1,x,'linewidth',2),grid on
ylim([-0.1 1.1]);
legend('y_2(t)')
```

Static (Memory less) and Dynamic (with Memory) Systems:

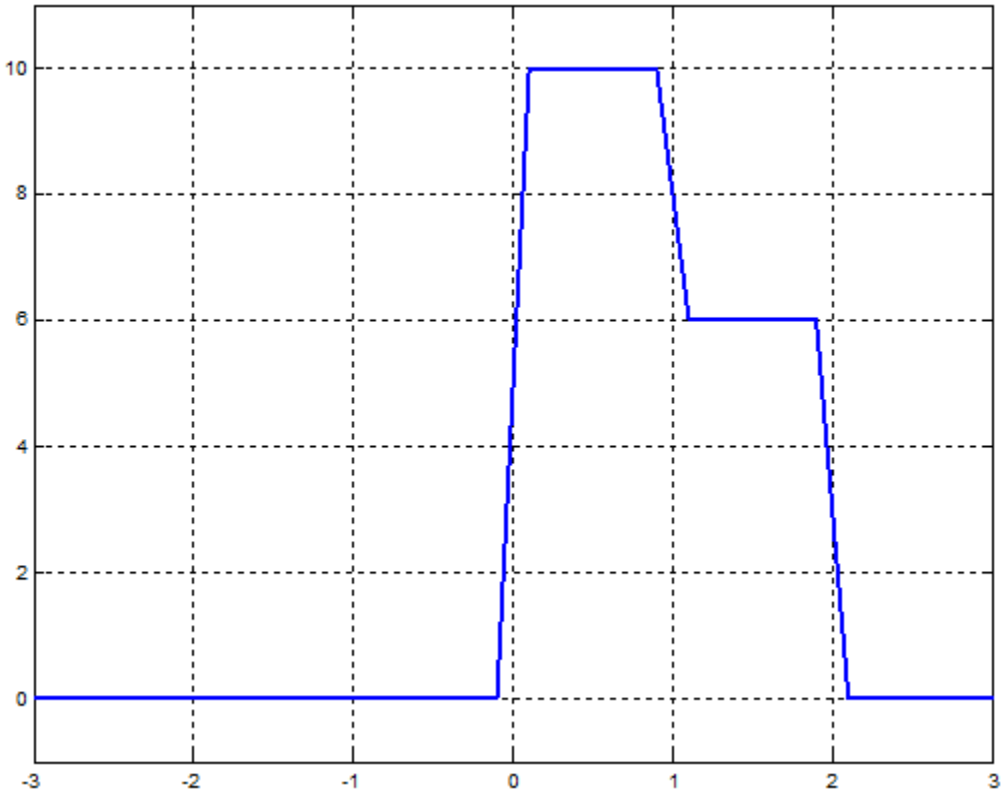
```
t1=-3:0.1:0;
x1=zeros(size(t1));
t2=0:0.1:1;
x2=ones(size(t2));
t3=1:0.1:3;
x3=zeros(size(t3));
t=[t1 t2 t3];
x=[x1 x2 x3];
subplot(2,1,1)
plot(t,x,'linewidth',2),grid on
ylim([-0.1 1.1]);
legend('x(t)')
subplot(2,1,2)
plot(t,3*x,'linewidth',2),gridon
ylim([-0.1 3.1]);
legend('y(t)')
```



Linear and Non-linear Systems:

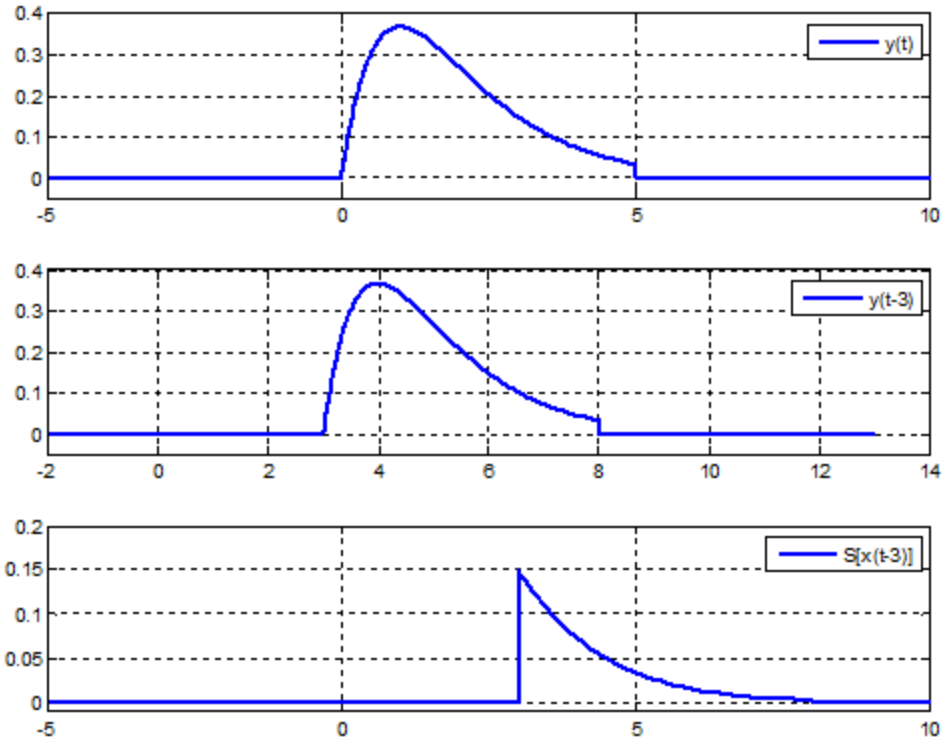
```
t=-3:0.1:3;
x1=heaviside(t)-heaviside(t-1);
x2=heaviside(t)-heaviside(t-2);
%computation of the left side of equation 5.1
a1=2;
a2=3;
z=a1*x1+a2*x2;
y=2*z;
plot(t,y,'linewidth',2),grid on
ylim([-1 11])
%computation of the right side of equation 5.1
```

```
y=a1*z1+a2*z2;
plot(t,y,'linewidth',2),grid on
ylim([-1 11])
```



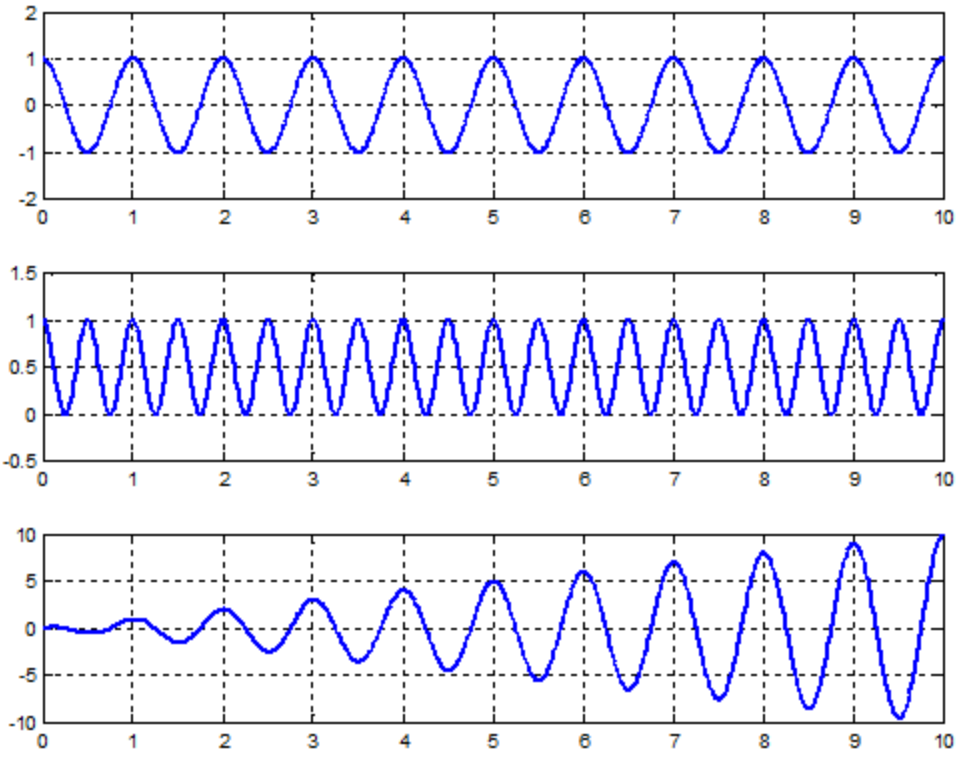
Time-Invariant and Time-Variant Systems:

```
t=-5:0.001:10;
p=heaviside(t)-heaviside(t-5);
y=t.*exp(-t).*p;
subplot(3,1,1)
plot(t,y,'linewidth',2),grid on
ylim([-0.05 0.4])
legend('y(t)')
subplot(3,1,2)
plot(t+3,y,'linewidth',2),grid on
ylim([-0.05 0.4])
legend('y(t-3)')
t=-5:0.001:10;
p=heaviside(t-3)-heaviside(t-8);
y=t.*exp(-t).*p;
subplot(3,1,3)
plot(t,y,'linewidth',2),grid on
ylim([-0.01 0.2])
legend('S[x(t-3)]')
```



Stable and Unstable Systems:

```
t=0:0.01:10;
x=cos(2*pi*t);
subplot(3,1,1)
plot(t,x,'linewidth',2), grid on
ylim([-2 2])
y1=x.^2;
subplot(3,1,2)
plot(t,y1,'linewidth',2), grid on
ylim([-0.5 1.5])
y2=t.*x;
subplot(3,1,3)
plot(t,y2,'linewidth',2), grid on
```


2
1
0
-1
-2
0 1 2 3 4 5 6 7 8 9 10
1.5
1
0.5
0
-0.5
0 1 2 3 4 5 6 7 8 9 10
10
5
0
-5
-10
0 1 2 3 4 5 6 7 8 9 10

THE END