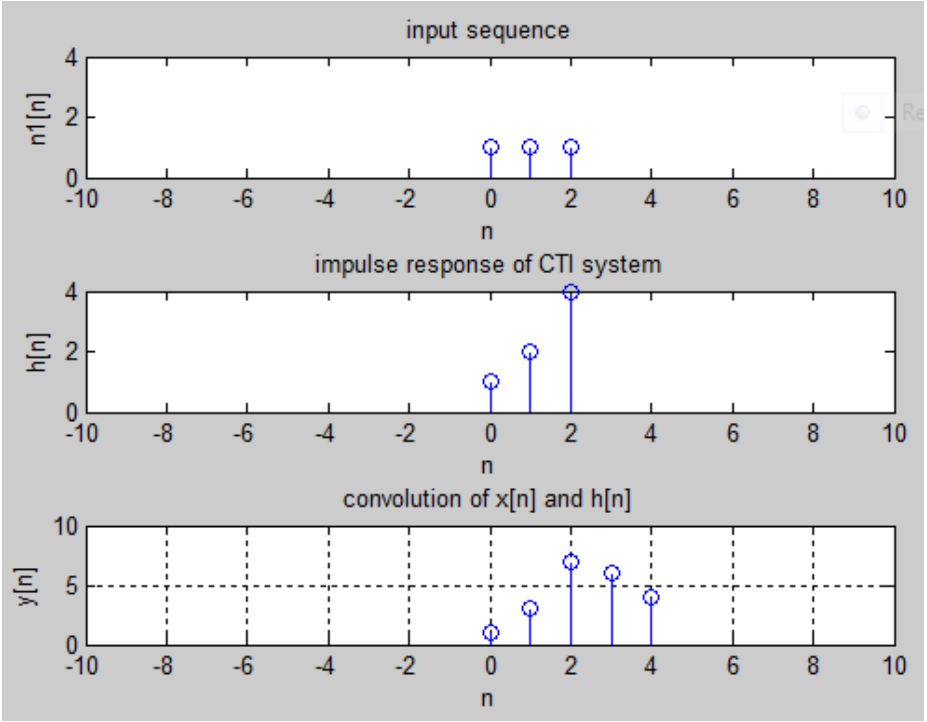
Lab Task

1) X[n] = {1,1,1}
   H[n] = {1,2,4}

Code:

```
x = [1,1,1];
n1 = 0:1:2;
h = [1,2,4];
n2 = 0:1:2;
y = conv(x,h);
n = 0:1:4;

subplot(3,1,1);
stem(n1,x);
xlabel('n');
ylabel('n1[n]');
title('input sequence');
axis([-10 10 0 4]);

subplot(3,1,2);
stem(n2,h);
xlabel('n');
ylabel('h[n]');
title('impulse response of CTI system');
axis([-10 10 0 4]);

subplot(3,1,3);
stem(n,y);
grid on;
xlabel('n');
ylabel('y[n]');
title('convolution of x[n] and h[n]');
axis([-10 10 0 10]);
```

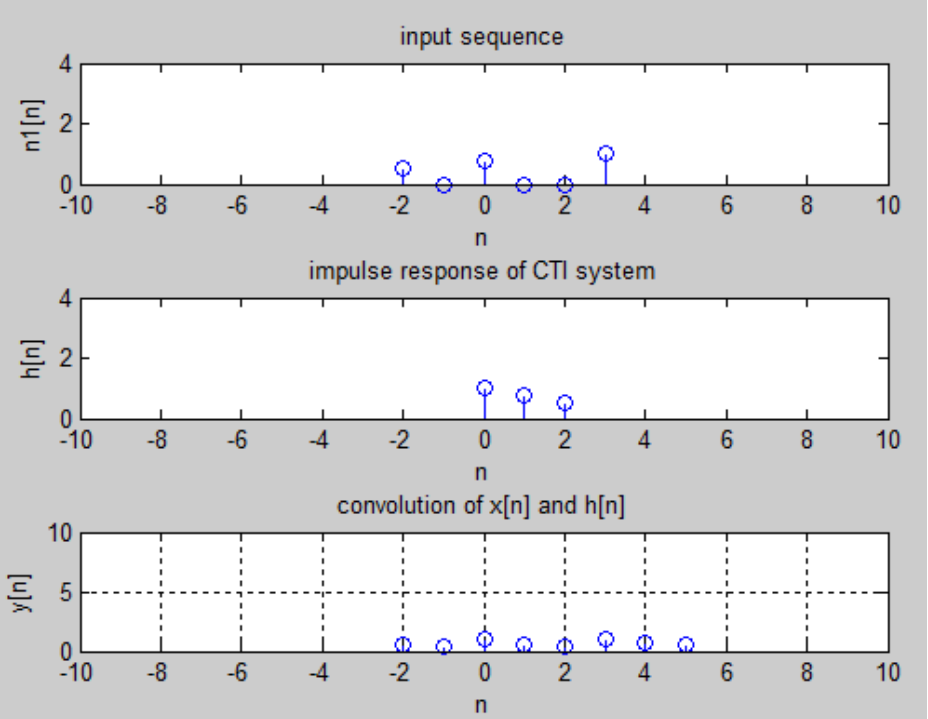


2) X[n] = {0.5,0,0.75,0,0,1} (n=0 at X[n]=0.75)

H[n] = {1,0.75,0.5}

Code:

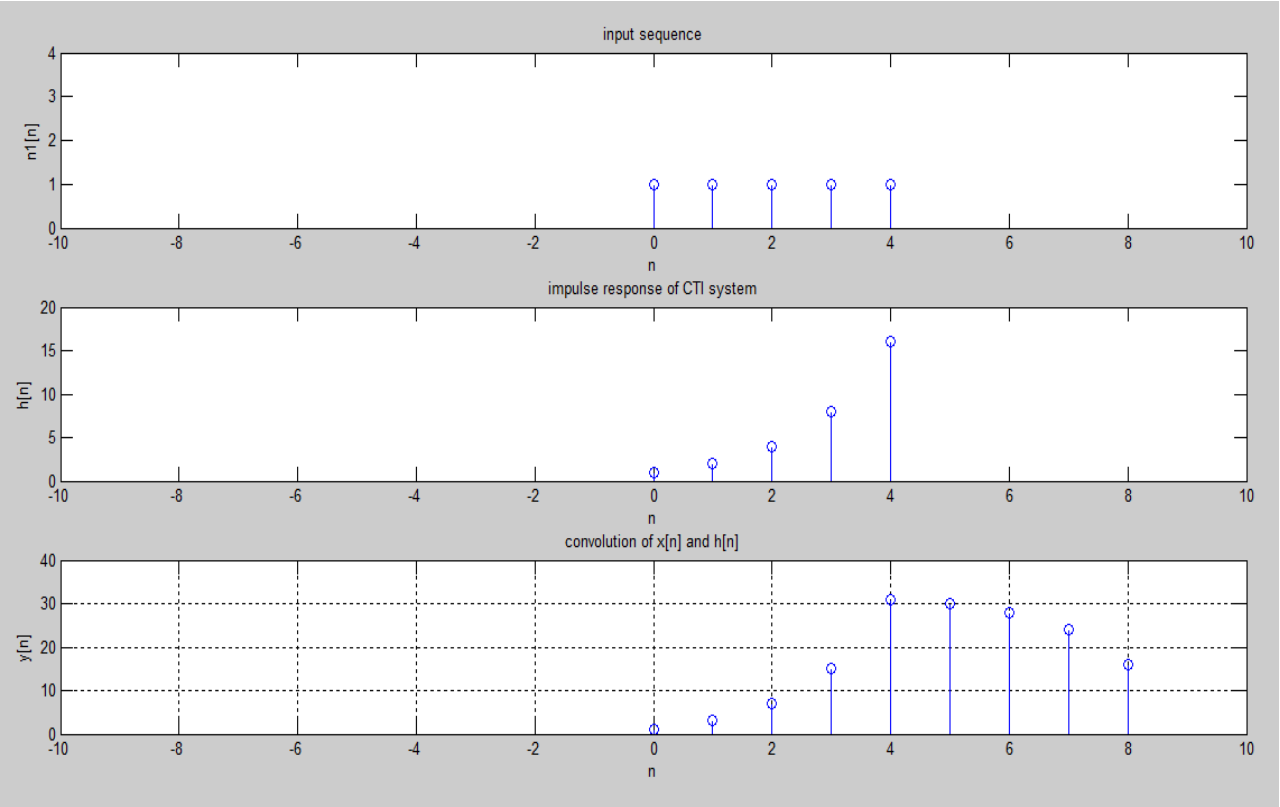
```
x = [0.5,0,0.75,0,0,1];
n1 = -2:1:3;
h = [1,0.75,0.5];
n2 = 0:1:2;
y = conv(x,h);
n = -2:1:5;

subplot(3,1,1);
stem(n1,x);
xlabel('n');
ylabel('n1[n]');
title('input sequence');
axis([-10 10 0 4]);

subplot(3,1,2);
stem(n2,h);
xlabel('n');
ylabel('h[n]');
title('impulse response of CTI system');
axis([-10 10 0 4]);

subplot(3,1,3);
stem(n,y);
grid on;
xlabel('n');
ylabel('y[n]');
title('convolution of x[n] and h[n]');
axis([-10 10 0 10]);
```



3) X[n] = {1,1,1,1,1}
H[n] = 2^n

Code:

```
x = [1,1,1,1,1];
n1 = 0:1:4;
h = power(2,n2);
n2 = 0:1:4;
y = conv(x,h);
n = 0:1:8;

subplot(3,1,1);
stem(n1,x);
xlabel('n');
ylabel('n1[n]');
title('input sequence');
axis([-10 10 0 4]);

subplot(3,1,2);
stem(n2,h);
xlabel('n');
ylabel('h[n]');
title('impulse response of CTI system');
axis([-10 10 0 20]);

subplot(3,1,3);
stem(n,y);
grid on;
xlabel('n');
ylabel('y[n]');
title('convolution of x[n] and h[n]');
axis([-10 10 0 40]);
```



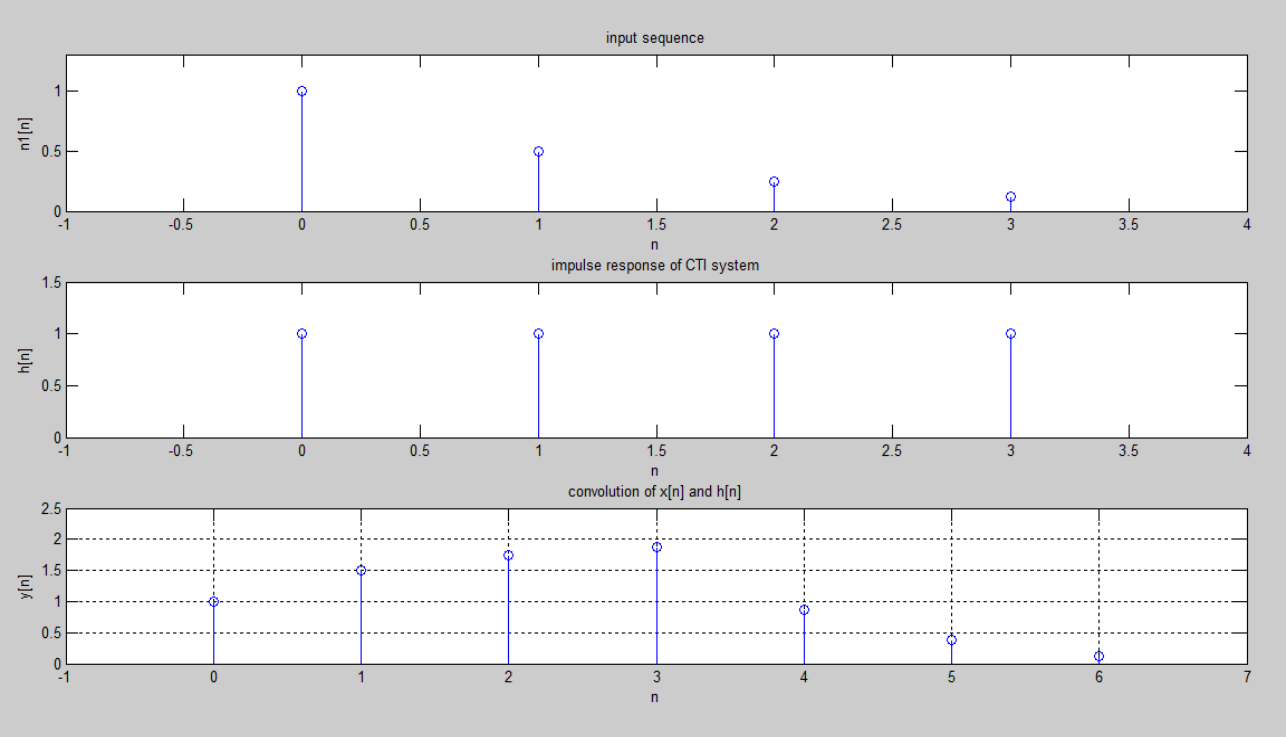
4) X[n] = a^n where -1<a<1

H[n] = {1,1,1,1}

Code:

```
x = power(0.5,n1);
n1 = 0:1:3;
h = [1,1,1,1];
n2 = 0:1:3;
y = conv(x,h);
n = 0:1:6;

subplot(3,1,1);
stem(n1,x);
xlabel('n');
ylabel('n1[n]');
title('input sequence');
axis([-1 4 0 1.3]);
```

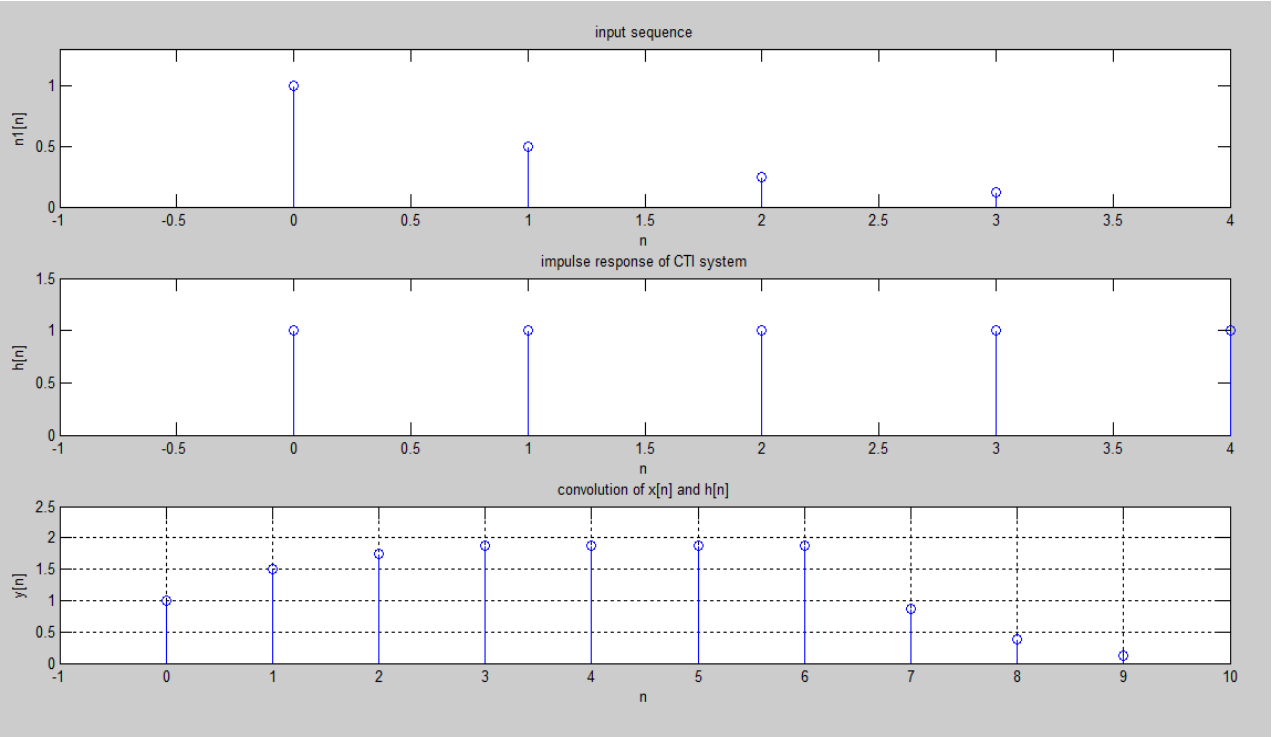
```
subplot(3,1,2);
stem(n2,h);
xlabel('n');
ylabel('h[n]');
title('impulse response of CTI system');
axis([-1 4 0 1.5]);

subplot(3,1,3);
stem(n,y);
grid on;
xlabel('n');
ylabel('y[n]');
title('convolution of x[n] and h[n]');
axis([-1 7 0 2.5]);
```



5) X[n] = a^nU[n] where a=0.5
   H[n] = U[n] - U[n-7]

Code:

```
x = power(0.5,n1);
n1 = 0:1:3;
h = [1,1,1,1,1,1,1];
n2 = 0:1:6;
y = conv(x,h);
n = 0:1:9;

subplot(3,1,1);
stem(n1,x);
xlabel('n');
ylabel('n1[n]');
title('input sequence');
axis([-1 4 0 1.3]);

subplot(3,1,2);
stem(n2,h);
xlabel('n');
ylabel('h[n]');
title('impulse response of CTI system');
axis([-1 4 0 1.5]);

subplot(3,1,3);
stem(n,y);
grid on;
xlabel('n');
ylabel('y[n]');
title('convolution of x[n] and h[n]');
axis([-1 10 0 2.5]);
```

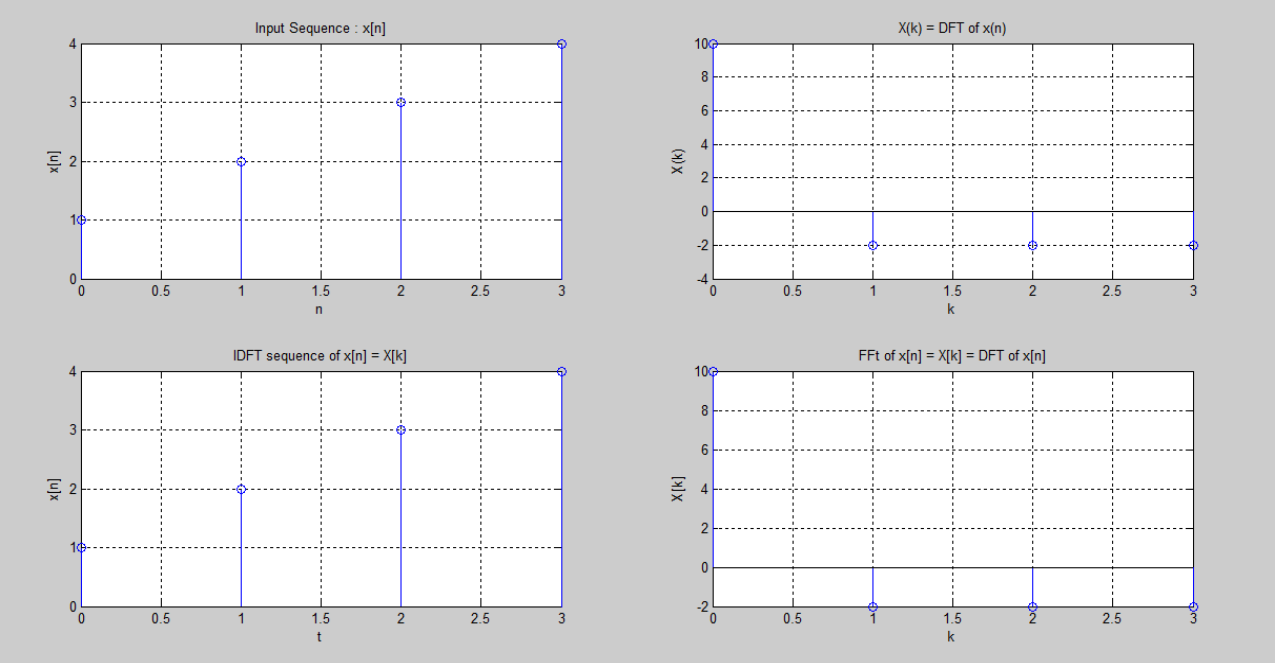

input sequence
n1[n]
n
impulse response of CTI system
h[n]
n
convolution of x[n] and h[n]
y[n]
n

Lab Task

Code:

```
clc;
clear all;
close all;

%Get the sequence from user
disp('The sequence from the user : ');
xn = input('Enter the input sequence x(n) : ');

%To find the length of the sequence
N = length(xn);

%to install an array of same size as that of input sequence
Xk = zeros(1,N);
iXk = zeros(1,N);

for k=0:N-1;
   for n=0:N-1;
      Xk(k+1)=Xk(k+1)+(xn(n+1)*exp((-i)*2*pi*k*n/N));
   end
end

%code block to plot the input sequence
t=0:N-1;
subplot(2,2,1);
stem(t,xn);
grid on;
ylabel('x[n]');
xlabel('n');
title('Input Sequence : x[n]');

%code block to plot the X(k)
disp('The discrete fourier transform of x(n) : ');
disp(Xk);
t=0:N-1;
subplot(2,2,2);
stem(t,Xk);
grid on;
ylabel('X(k)');
xlabel('k');
title('X(k) = DFT of x(n)');
```

```
for n=0:N-1;
   for k=0:N-1;
      iXk(n+1)=iXk(n+1)+(Xk(k+1)*exp(i*2*pi*k*n/N));
   end
end

iXk = iXk/N;

%code block to plot the output sequence
t=0:N-1;
subplot(2,2,3);
stem(t,xn);
grid on;
ylabel('x[n]');
xlabel('t');
title('IDFT sequence of x[n] = X[k]');

%code block to plot the FFT of input sequence using inbuilt function
x2 = fft(xn);
subplot(2,2,4);
stem(t,x2);
grid on;
ylabel('X[k]');
xlabel('k');
title('FFT of x[n] = X[k] = DFT of x[n]');
```



Lab Task

```
clc;
clear all;
close all;
x = [1 2 1 2 1 2 1 2];
n =0:length(x)-1;
X = fft(x); %DFT of the sequence
y = ifft(X); %IDFT

subplot(2,2,1);
stem(n,x);
grid on;
ylabel('x[n]');
xlabel('n');
title('Input Sequence : x[n]');
axis([-0.5 8 -1 2.5]);

subplot(2,2,2);
stem(n,real(X));
grid on;
ylabel('real[X]');
xlabel('n');
title('Real part of FFT of x[n]');
axis([-0.5 8 -5 14]);

subplot(2,2,3);
stem(n,imag(X));
grid on;
ylabel('imag[X]');
xlabel('n');
title('Imaginary part of FFT of x[n]');
axis([-0.5 8 -1 2.5]);

subplot(2,2,4);
stem(n,y);
grid on;
ylabel('y[n]');
```

```
xlabel('n');
title('IFFT of X[k]');
axis([-0.5 8 -1 2.5]);
```