Lab Report-02

Course no. ECE 4124
Course Title: Digital Signal Processing Sessional

Experiment Title: MATLAB implementation of-

1. Circular Convolution of two signals.
2. Plotting two given signals and their summation and subtraction.
3. Drawing two given signals in one figure

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Experiment No.: 02

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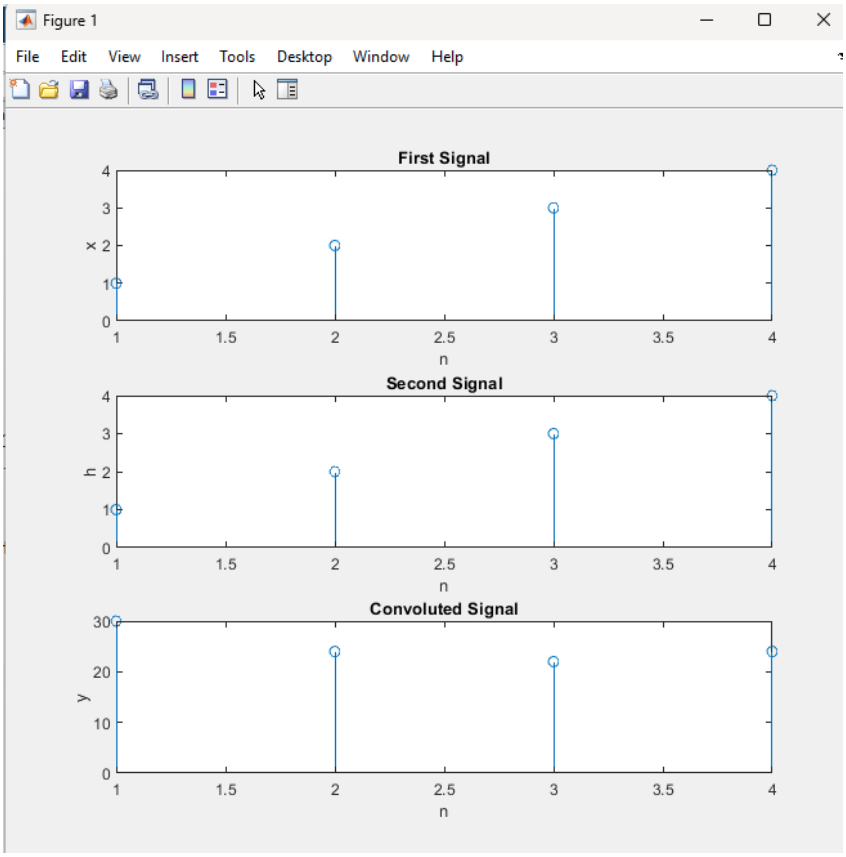
Theory: Circular convolution, also known as cyclic convolution, is a special case of periodic convolution, which is the convolution of two periodic functions that have the same period. Periodic convolution arises, for example, in the context of the discrete-time Fourier transform. In particular, the DTFT of the product of two discrete sequences is the periodic convolution of the DTFTs of the individual sequences. And each of them is a periodic summation of a continuous Fourier transform function. Although they are usually continuous functions of frequency, the concepts of periodic and circular convolution are also directly applicable to discrete sequences of data. In that context, circular convolution plays an important role in maximizing the efficiency of a certain kind of common filtering operation.

1. Circular Convolution of two signals.

Code:

```
x=[1 2 3 4];
h=[1 2 3 4];
n=length(x);

p=zeros(1,n);
for i=1:n

   j=i-1;

    for t=1:n

        if j>n-1
            j=j-n;
        end
        j=j+1;
        p(t)=x(t)*h(j);

    end
g(i)=sum(p);

end


subplot(3,1,1);
stem(x);
xlabel('n');
ylabel('x');
title('First Signal');

subplot(3,1,2);
stem(h);
xlabel('n');
ylabel('h');
title('Second Signal');

subplot(3,1,3);
stem(g);
ylabel('y');
xlabel('n');

title('Convoluted Signal');
```

Output:

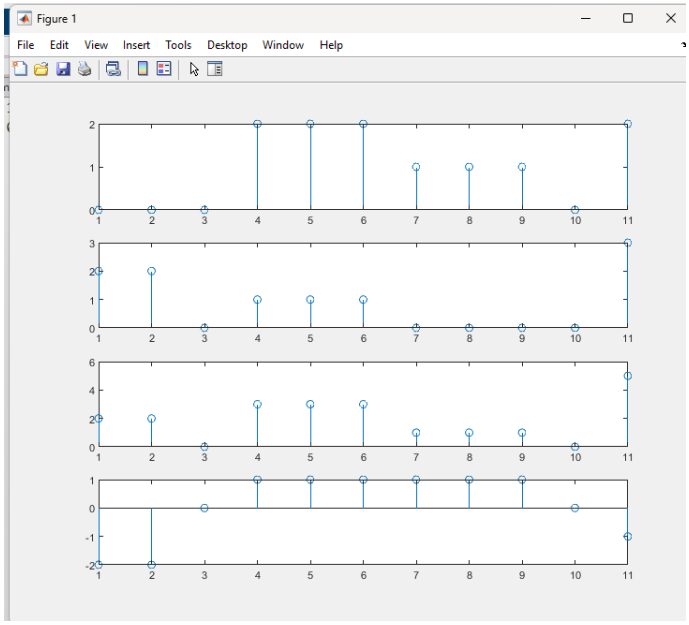


2. Plotting two given signals and their summation and subtraction.

Code:

```
n=[0 0 0 2 2 2 1 1 1 0 2];
m=[2 2 0 1 1 1 0 0 0 0 3];
subplot(4,1,1);
stem(n);
subplot(4,1,2);
stem(m);

subplot(4,1,3);
stem(n+m);

subplot(4,1,4);
stem(n-m);
```

Output:

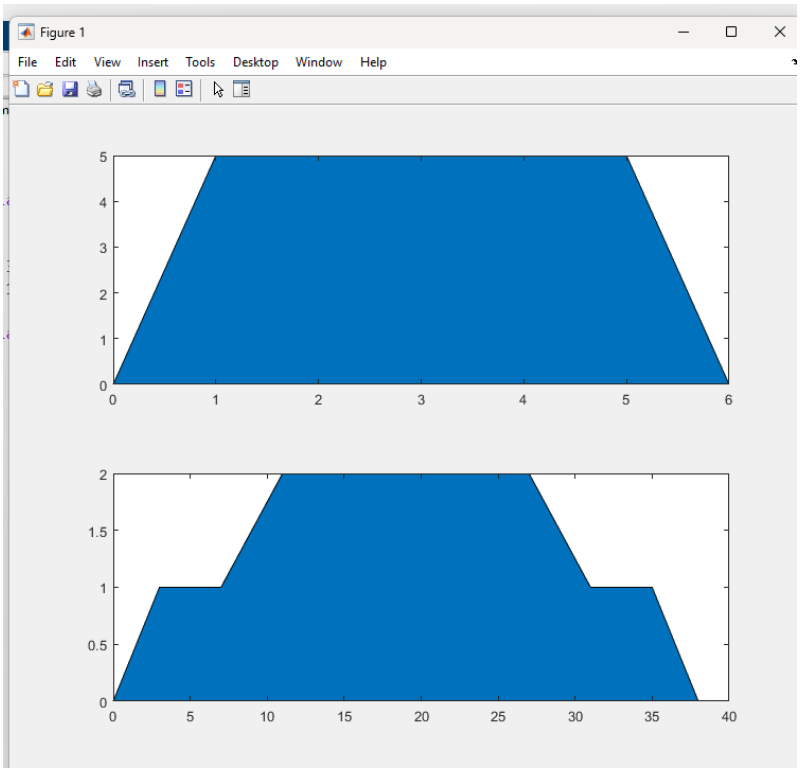


3. Drawing two given signals in one figure

Code:

```
a=[0 1 5 6];
b=[0 5 5 0];
subplot(2,1,1);
area(a,b,'DisplayName','b');


c=[0 3 7 11 27 31 35 38];
d=[0 1 1 2 2 1 1 0];
subplot(2,1,2);
area(c,d,'DisplayName','d');
```

Output:



Conclusion: Thus we have successfully implemented all the signals in MATLAB. The output was found as expected.