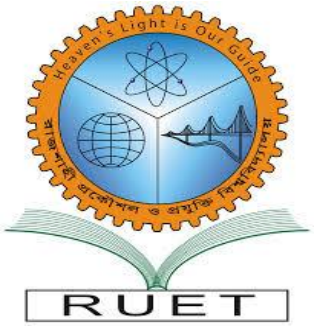


Rajshahi University of Engineering & Technology, Rajshahi

COURSE TITLE- Digital Signal Processing Sessional

COURSE NO- ECE 4124

18 SERIES

Submitted By:

Name: Israt Zahan

ROLL: 1810057

Dept. of Electrical & Computer Engineering

RUET

Submitted To:

Hafsa Binte Kibria

Lecturer

Dept. of Electrical & Computer Engineering

RUET

Experiment No: 03

Experiment Name: Cross correlation and Auto correlation of a signal.

Experiment Date: 07/05/23

Theory:

The correlation of two functions or signals or waveforms is defined as the measure of similarity between those signals. There are two types of correlations −

- Cross-correlation
- Autocorrelation

Cross-correlation- The cross-correlation between two different signals or functions or waveforms is defined as the measure of similarity or coherence between one signal and the time-delayed version of another signal. The cross-correlation between two different signals indicates the degree of relatedness between one signal and the time-delayed version of another signal.

Autocorrelation- The autocorrelation function is defined as the measure of similarity or coherence between a signal and its time delayed version. Therefore, the autocorrelation is the correlation of a signal with itself.

Required Software: MATLAB

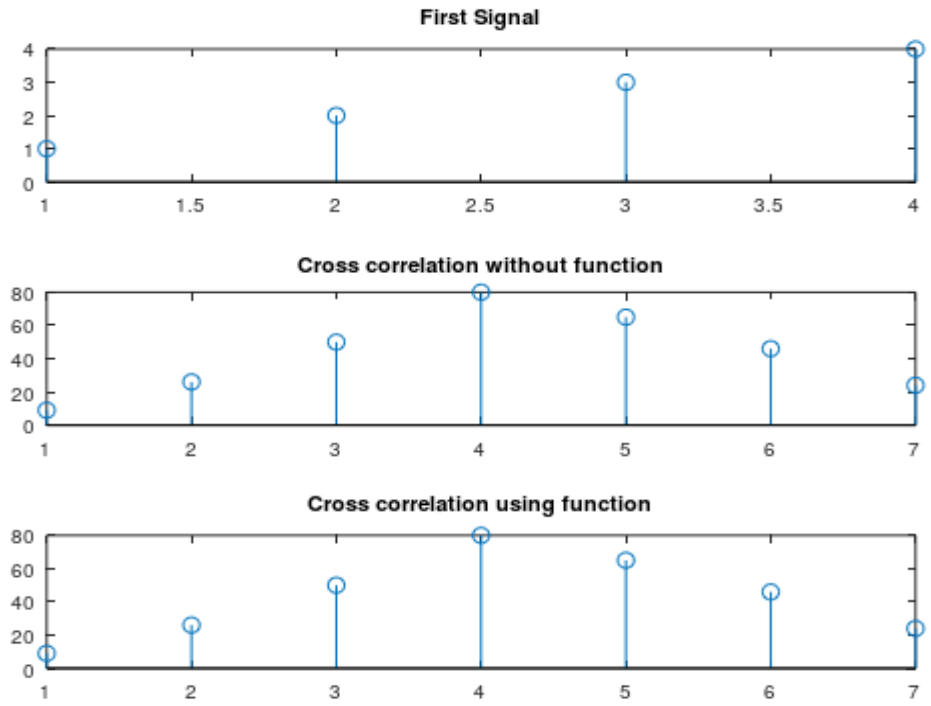
Code:

I. Cross-correlation:

```
clc;
clear all;
close all;

x=[1 2 3 4];
y=[6 7 8 9];
h=fliplr(y)
z=zeros(1,length(x) + length(h)-1);

for i=1:length(z)
  for k=1:length(h)
    if i-k+1>0 && i-k+1 <= length(x)
      z(i) = z(i)+h(k)*x(i-k+1);
    end
  end
 end

 subplot(3,1,1);
 stem(x);
 title('First Signal');
```

```
subplot(3,1,2);
stem(z);
title('Cross correlation without function');

subplot(3,1,3);
w=xcorr(x,y);
stem(w);
title('Cross correlation using function');
```

Output:

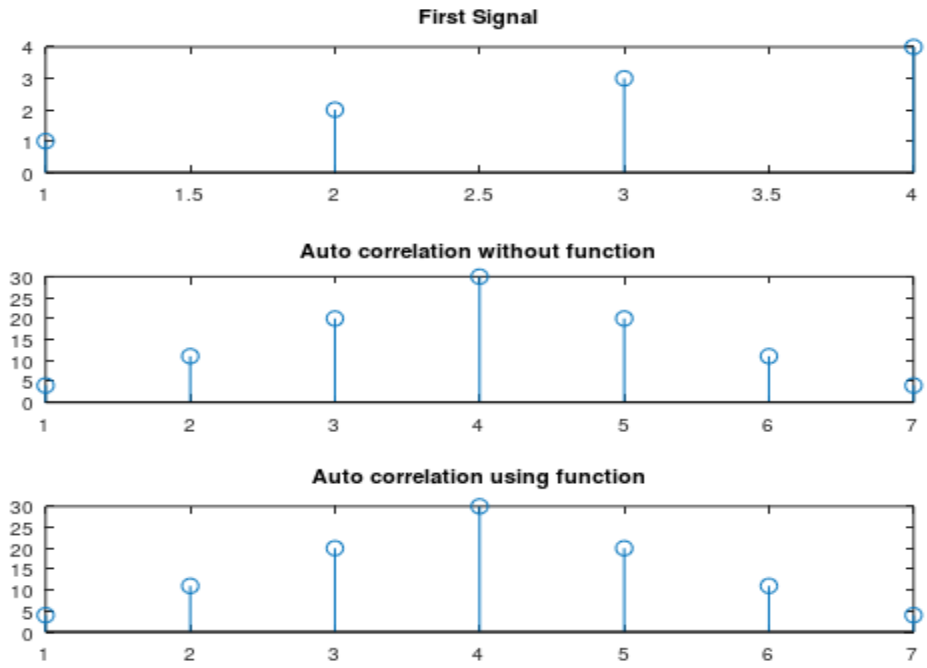


II. Autocorrelation:

```
clc;
clear all;
close all;

x=[1 2 3 4];
h=fliplr(x)
z=zeros(1,length(x) + length(h)-1);

for i=1:length(z)
  for k=1:length(h)
    if i-k+1>0 && i-k+1 <= length(x)
      z(i) = z(i)+h(k)*x(i-k+1);
    end
  end
 end
```

```
subplot(3,1,1);
stem(x);
title('First Signal');

subplot(3,1,2);
stem(z);
title('Auto correlation without function');

subplot(3,1,3);
w=xcorr(x);
stem(w);
title('Auto correlation using function');
```

Output:



Discussion:

In this experiment we plotted Correlation discrete signal. That's are cross correlation & auto correlation. Here firstly in cross correlation we plotted three signal that's are signal of (x), without using a function & using xcorr function. Secondly in auto correlation we plotted three signal same as cross correlation. Here we have observed that using xcorr function & without using the function the cross & auto correlation signal were same.

Conclusion: All the desired outputs were achieved successfully.