

# **Digital Signal Processing Lab**

Computation of Auto Correlation and Cross correlation

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# Experiment 2 :

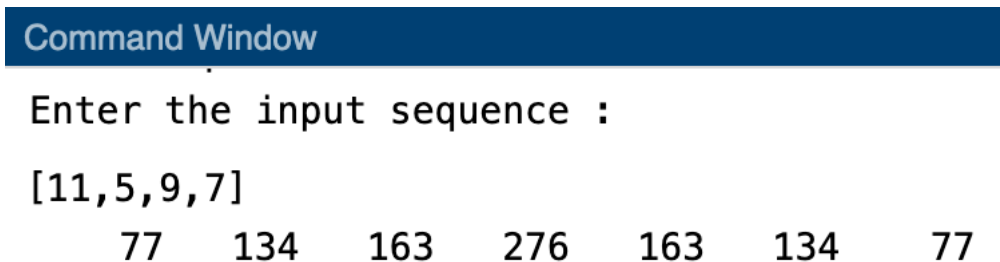
## (Auto Correlation)

Program Code :

```
close();
clear();
x = input("Enter the input sequence : ");
[z, lag] = xcorr(x);
disp(z);
subplot(2,1,1);
stem(x);
xlabel('n');
ylabel('x[n]');
title('Input Sequence');
subplot(2,1,2);
stem(lag,z);
xlabel('n');
ylabel('x[n]');
title('Auto-Related Sequence');
```

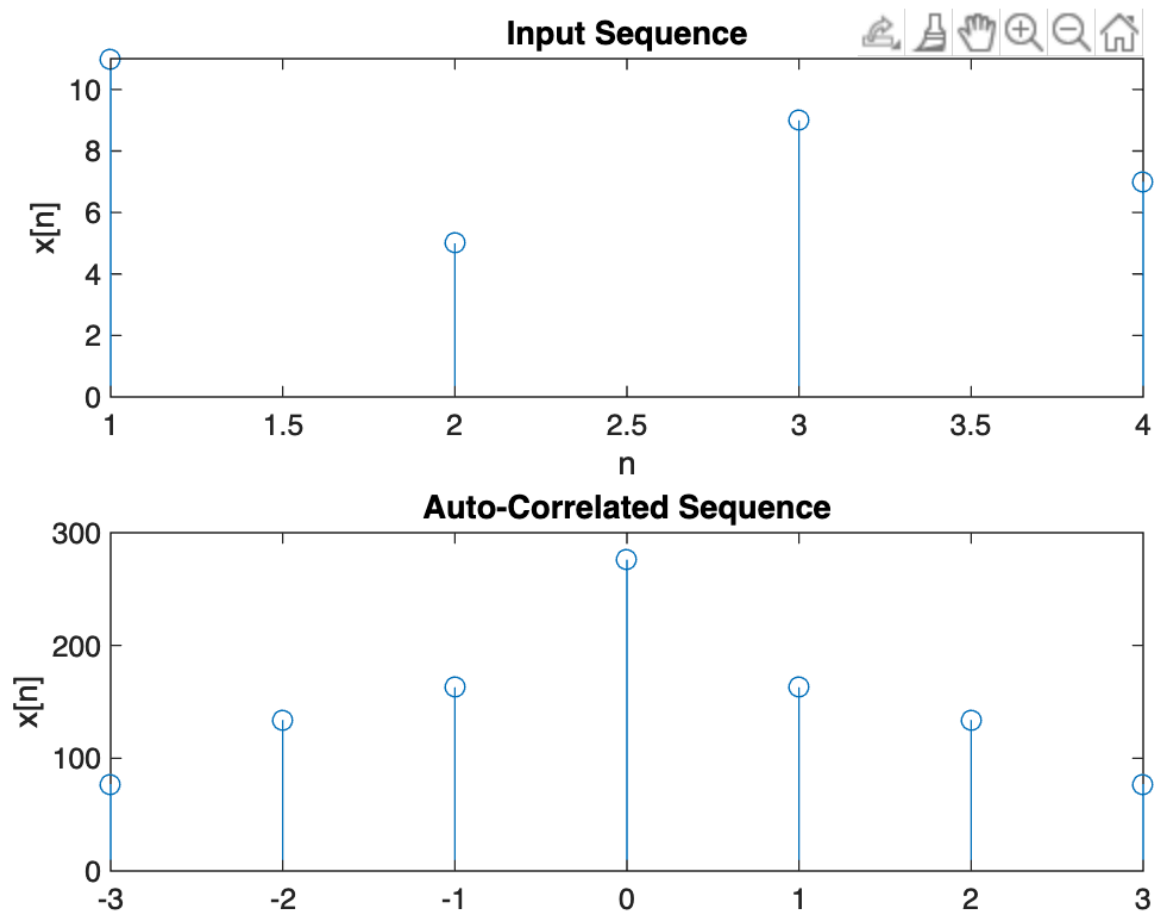
Output :

Command Window



```
Command Window
Enter the input sequence :
[11,5,9,7]
      77      134      163      276      163      134      77
```

Figure (Plot)



# **Manual Calculation Auto Correlation Using Matrix Method**

Table 1

	INPUT SEQUENCE	11	5	9	7	
		MATRIX METHOD				
		11	5	9	7	
	7	77	35	63	49	
	9	99	45	81	63	
	5	55	25	45	35	
	11	121	55	99	77	
	CORRELATED SEQUENCE	77	134	163	276	163

# Experiment 2 :

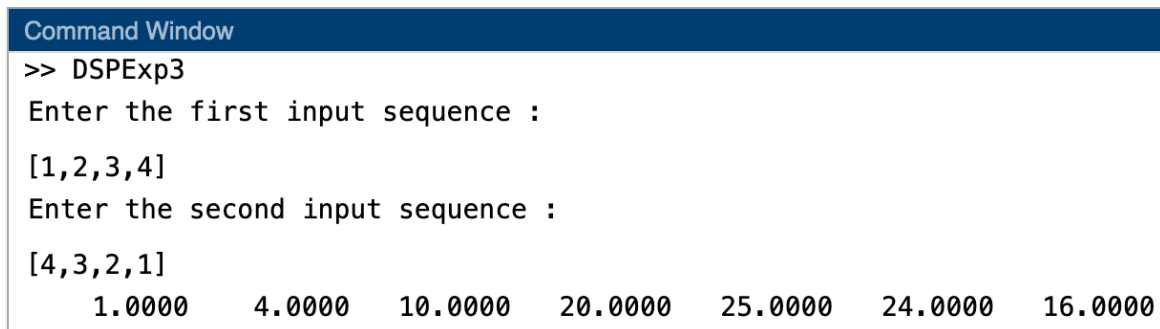
## (Cross Correlation)

Program Code :

```
close();
clear();
x = input("Enter the first input sequence : ");
y = input("Enter the second input sequence : ");
[z, lag] = xcorr(x, y);
disp(z);
subplot(3,1,1);
stem(x);
xlabel('n');
ylabel('x[n]');
title('First Input Sequence');
subplot(3,1,2);
stem(y);
xlabel('n');
ylabel('y[n]');
title('Second Input Sequence');
subplot(3,1,3);
stem(lag,z);
xlabel('n');
ylabel('x[n]');
title('Cross-Related Sequence');
```

Output :

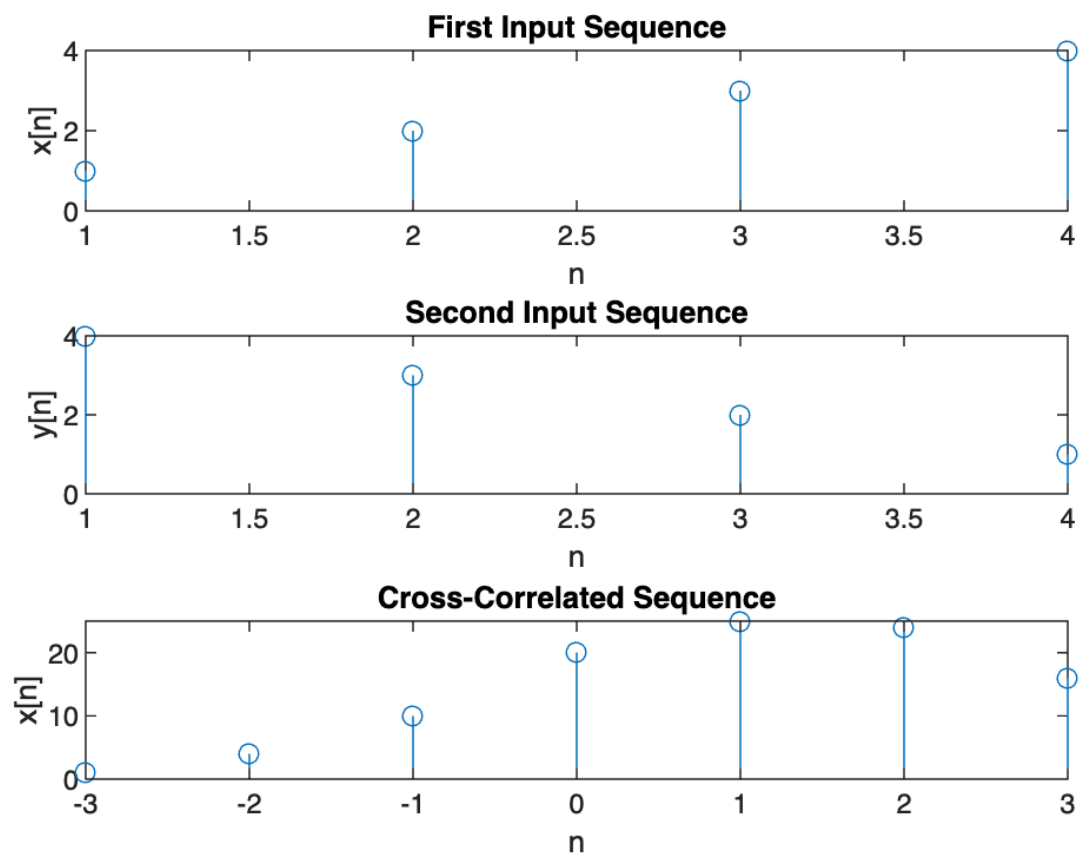
Command Window



Command Window

```
>> DSPExp3
Enter the first input sequence :
[1,2,3,4]
Enter the second input sequence :
[4,3,2,1]
    1.0000    4.0000   10.0000   20.0000   25.0000   24.0000   16.0000
```

Figure (Plot)



# **Manual Calculation of Cross Correlation Matrix Method**



Table 1

	INPUT SEQUENCE 1	1	2	3	4	
	INPUT SEQUENCE 2	4	3	2	1	
		MATRIX METHOD				
		1	2	3	4	
	1	1	2	3	4	
	2	2	4	6	8	
	3	3	6	9	12	
	4	4	8	12	16	
	CORRELATED SEQUENCE	1	4	10	20	25