Lab Report # 08

CSE301 - L Signals & Systems Lab

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Class Section: "A"

Submitted to:

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UET Peshawar

301L: Signals & Systems Lab

LAB ASSESSMENT RUBRICS

Marking Criteria	Exceeds expectation (5-4)	Meets expectation (3-2)	Does not meet expectation (1)	Score
1. Realization of Experiment	Program compiles (noerrors and no warnings). Program always works correctly and meets the specification(s). Completed between 71-100% of the requirements.	Program compiles (no errors and some warnings). Some details of the program specification are violated, program functions incorrectly for some inputs. Completed between 41-70% of the requirements.	Program fails to or compile with lots of warnings. Program only functions correctly in very limited cases or not at all. Completed less than 40% of the requirements.	30%
2. Ability to apply required code utility or data structure	Able to apply required data type or data structure and produce correct results. Familiarize and selects proper functions for simulation of given problem using software tools like MATLAB.	Able to apply required data type or data structure but does not produce correct results. Need guidance to select proper functions for simulation of given problem using software tools like MATLAB.	Unable to identify required data type or data structure. Incapable of selecting proper functions for simulation of given problem using software tools like MATLAB.	20%
3. Documentation	Clearly and effectively documented including descriptions of all variables/functions. Specific purpose is noted for each function, control structure, input requirements and output results.	Basic documentation including descriptions of all variables/functions. Specific purpose is noted for each function and control structure.	No documentation included.	10%

4. Ability to run/debug	Executes Matlab codes without errors, excellent user	Executes Matlab codes without errors. User prompts are	Does not execute Matlab codes due to errors.	20%
	prompts, good use of symbols, spacing in output. Thorough and organized testing has been completed and output from test cases is included.	understandable, minimum use of symbols or spacing in output. Some testing has been completed.	User prompts are misleading or nonexistent. No testing has been completed.	
5. Results compilation	Show processed results effectively by conducting simple computations and plotting using collected data	Show processed results effectively by conducting simple computations and plotting using collected data with minor error	Unable to show processed results effectively by conducting simple computations and plotting using collected data with minor error	10%
6. Efficiency	Excellent use of CPU and Memory.	Good but not smart use of CPU and Memory.	Inefficient use of CPU and Memory.	10%
7. Lab Performance (Team work and Lab etiquettes)	Actively engages and cooperates with other group members in an effective manner. Respectfully and carefully observes safety rules and procedures	Cooperates with other group members in a reasonable manner. Observes safety rules and procedures with minor deviation.	Distracts or discourages other group members from conducting the experiment. Disregards safety rules and procedures.	10%

Instructor:

Name: _____

Signature: _____

Signals & Systems Laboratory

MAKING SIGNALS CAUSAL AND NON-CAUSAL:

A causal signal is a signal whose output depends only on the present and past values of the input. A non-causal signal is a signal whose output depends on the future values of the input. Non-causal signals can be useful in some applications, such as prediction and control. However, they cannot be implemented in practice because they require knowledge of the future.

Causal Signals:

A signal is said to be causal if it is zero for time t<0. signal can be made causal by multiplying it with unit step.

OBJECTIVES OF THE LAB

- Making Signals Causal and Non-Causal
- Convolution
- Properties of Convolution

TASK 01

CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task1.m

Task1.m

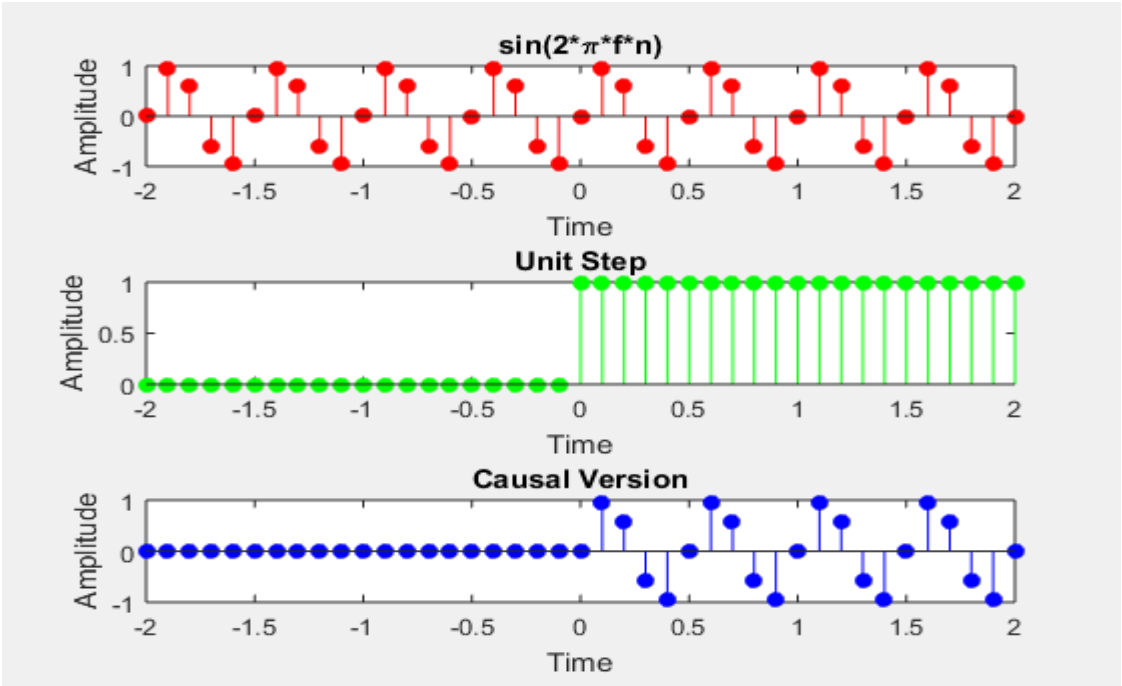
```
clc
clear
clear all

n= -2:1/10:2;
x1 = sin(2*pi*2*n);
subplot(3,1,1);
stem(n,x1,'r','filled');
xlabel('Time');
ylabel('Amplitude');
title('sin(2*\pi*f*n)');

u = (n>=0);
x2 = x1.*u;
subplot(3,1,2);
stem(n,u, 'g','filled');
xlabel('Time');
ylabel('Amplitude');
title('Unit Step');

subplot(3,1,3);
stem(n,x2, 'b','filled');
xlabel('Time');
ylabel('Amplitude');
title('Causal Version');
```

OUPUT:



TASK 02:

CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task2.m*

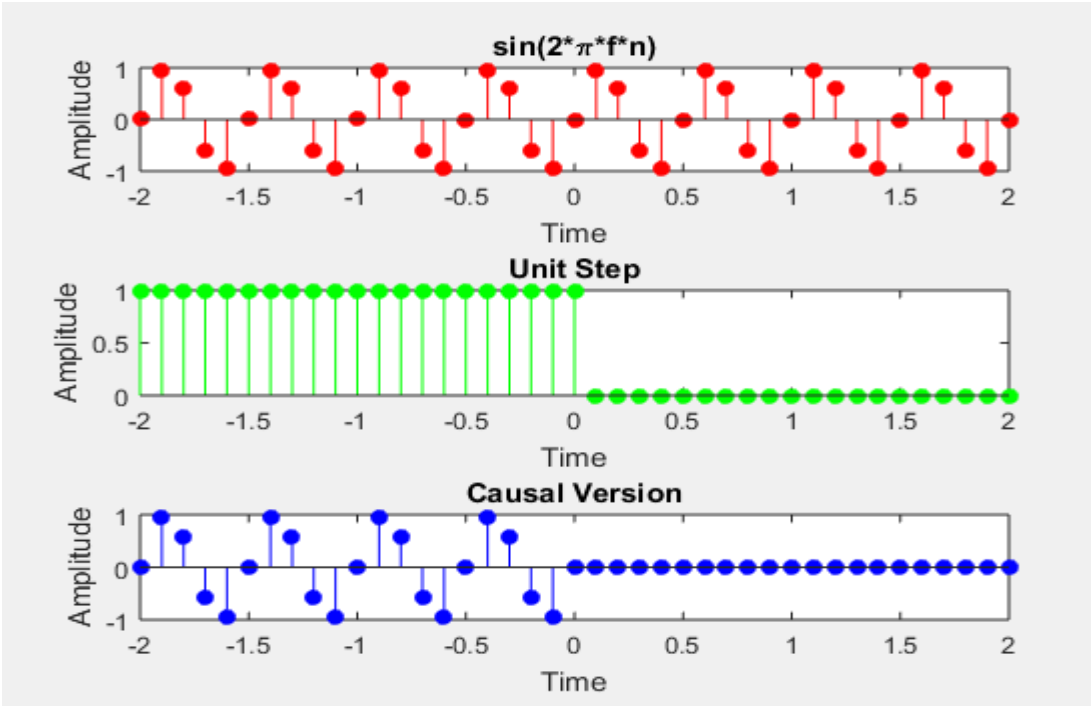
Task1.m | Task2.m*

```
%Task2
n= -2:1/10:2;
x1 = sin(2*pi*2*n);
subplot(3,1,1);
stem(n,x1,'r','filled');
xlabel('Time');
ylabel('Amplitude');
title('sin(2*\pi*f*n)');

u = (n<=0);
x2 = x1.*u;
subplot(3,1,2);
stem(n,u, 'g','filled');
xlabel('Time');
ylabel('Amplitude');
title('Unit Step');

subplot(3,1,3);
stem(n,x2, 'b','filled');
xlabel('Time');
ylabel('Amplitude');
title('Causal Version');
```

OUPUT:



TASK 03:

CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task3.m

Task1.m | Task2.m | Task3.m | SigCausal.m

```
%Task3
clc
clear all
n = -10:10;
x = -10:10;
SigCausal(n,x)
```

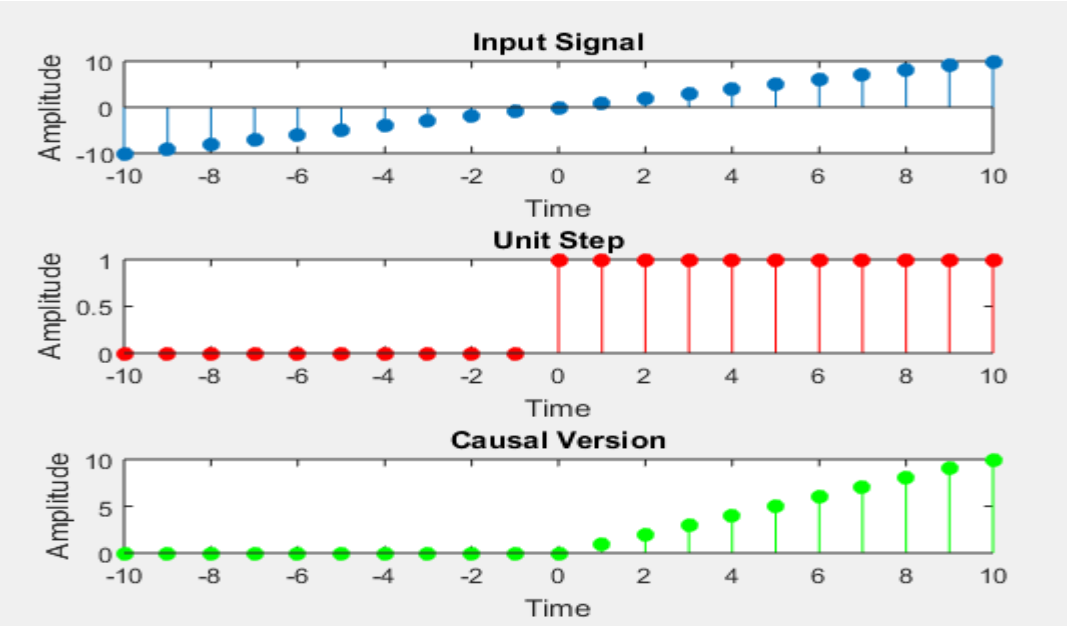
Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\SigCausal.m

Task1.m | Task2.m | Task3.m | SigCausal.m

```
function  SigCausal(n,x)
subplot(3,1,1);
stem(n,x,'filled');
xlabel('Time');
ylabel('Amplitude');
title('Input Signal');

u = (n>=0);
xl = x.*u;
subplot(3,1,2);
stem(n,u, 'r','filled');
xlabel('Time');
ylabel('Amplitude');
title('Unit Step');
subplot(3,1,3);
stem(n,xl, 'g','filled');
xlabel('Time');
ylabel('Amplitude');
title('Causal Version');
end
```

OUPUT:



TASK 04

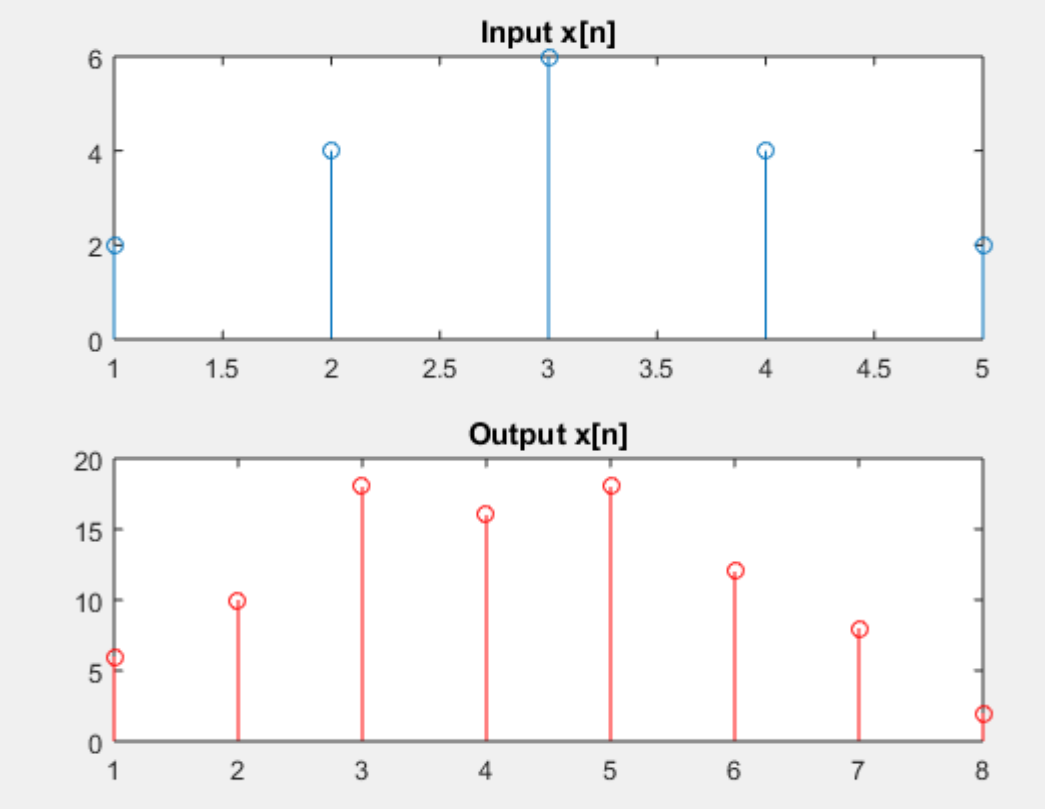
CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task4.m

Task4.m

```
%Task4
clc
clear all
close all
h = [3 -1 2 1];
x = [2 4 6 4 2];
output = conv(h, x);
subplot(2,1,1)
stem(x);
title('Input x[n]');
subplot(2,1,2)
stem(output, 'r');
title('Output x[n]');
```

OUPUT:



TASK 05

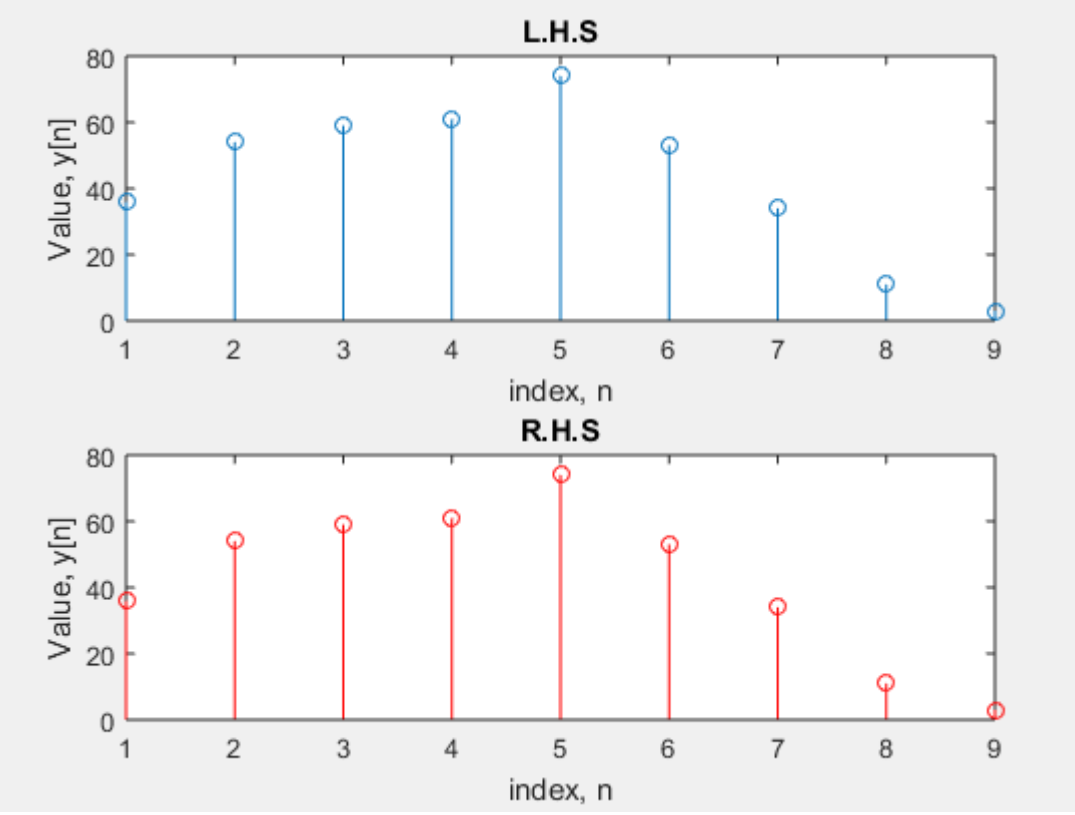
CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task5.m*

Task4.m | Task5.m*

```
%Task5
x1 = [3 1 1];
x2 = [4 2 1];
x3 = [3 2 1 2 3];
y1 = conv(x1,x2);
y2 = conv(y1,x3);
subplot(2,1,1);
stem(y2);
title('L.H.S');
xlabel('index, n');
ylabel('Value, y[n]');
y3=conv(x2,x3);
y4=conv(y3,x1);
subplot(2,1,2);
stem(y4,'r');
title('R.H.S');
xlabel('index, n');
ylabel('Value, y[n]');
```

OUPUT:



TASK 06

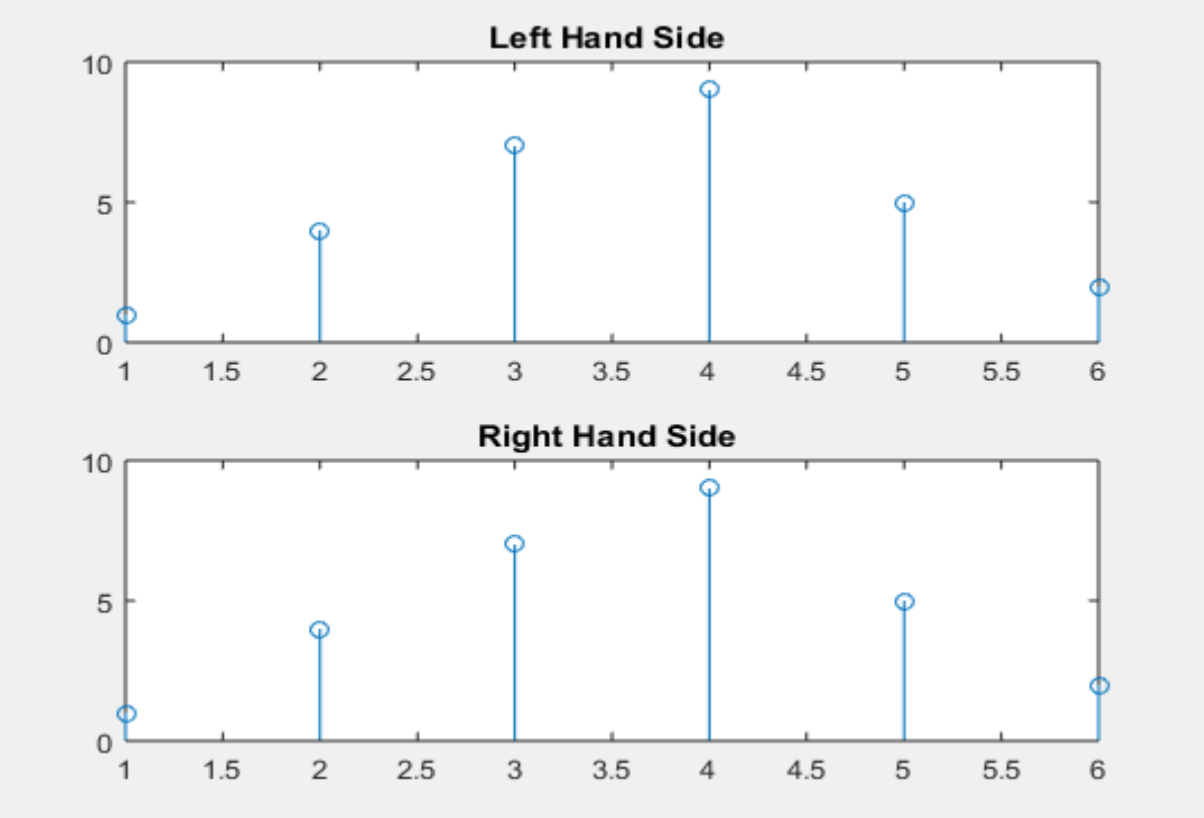
CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task6.m

Task4.m | Task5.m | Task6.m

```
1   %Task6
2 - clc
3 - clear all
4 - XoFn=[1 3 2 1];
5 - HoFn=[1 1 2];
6 - LHS = conv(XoFn,HoFn);
7 - RHS = conv(HoFn,XoFn);
8 - subplot(2,1,1);
9 - stem(LHS);
10 - title('Left Hand Side ');
11 - subplot(2,1,2);
12 - stem(RHS);
13 - title('Right Hand Side ');
```

OUPUT:



TASK 07

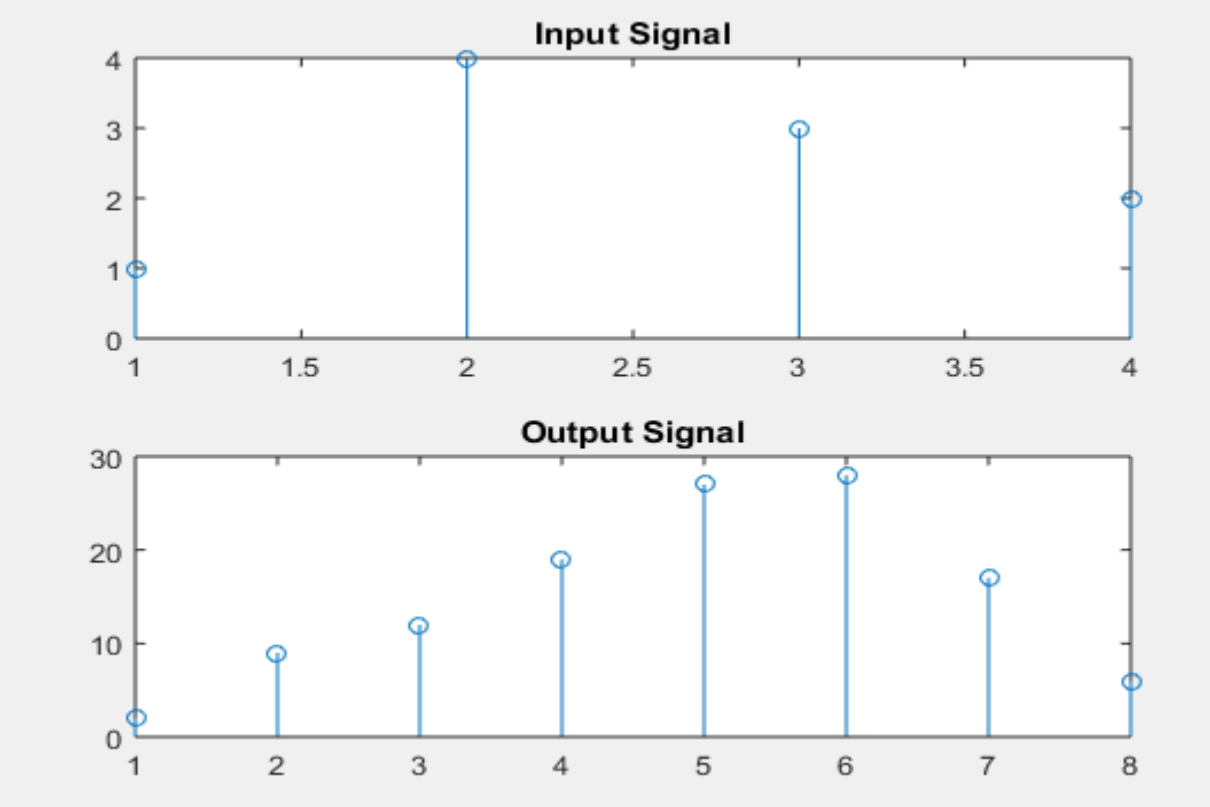
CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task7.m

Task7.m

```
%Task7
clc
clear all
H=[2 1 2 4 3];
X=[1 4 3 2];
result = conv(H,X);
subplot(2,1,1);
stem(X)
title('Input Signal')
subplot(2,1,2);
stem(result)
title('Output Signal')
```

OUPUT:



TASK 08

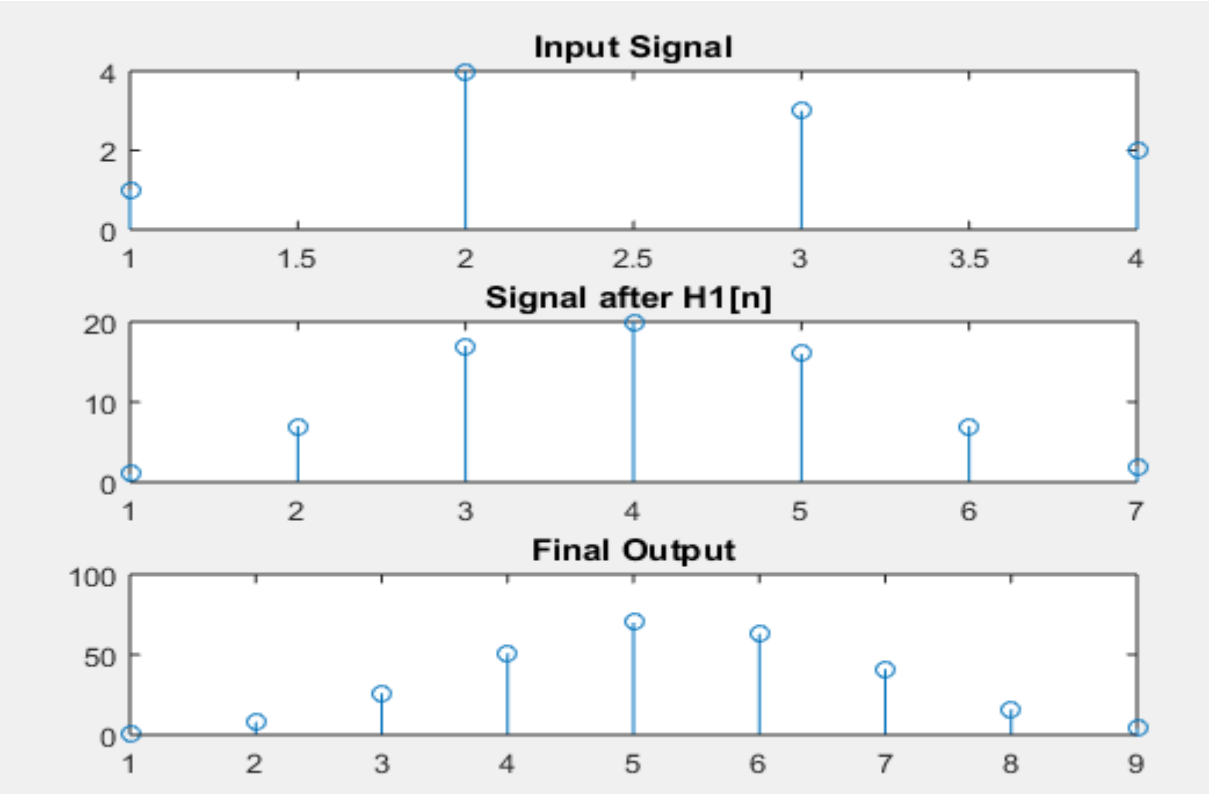
CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task8.m

Task8.m | Task9.m

```
%Task8
clc
clear all
H1=[1 3 2 1];
H2=[1 1 2];
X=[1 4 3 2];
result1=conv(H1,X);
y=conv(result1,H2);
subplot(3,1,1);
stem(X);
title('Input Signal');
subplot(3,1,2);
stem(result1);
title('Signal after H1[n] ')
subplot(3,1,3);
stem(y);
title('Final Output');
```

OUPUT:



TASK 09

CODE:

Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-08\Task9.m

Task9.m

```
%Task9
clc
clear all
X1=[2 -3 3 4 -2];
X2=[4 2 3 -1 -2];
X3=[3 5 -3 4];
% x1[n] * (x2[n] * x3[n]) = (x1[n] * x2[n]) * x3[n]
x2x3=conv(X2,X3);
LHS=conv(X1,x2x3);
% now RHS
x1x2=conv(X1,X2);
RHS=conv(x1x2,X3);
subplot(4,1,1);
stem(LHS);
title('LHS x1[n] * (x2[n] * x3[n])');
subplot(4,1,2);
stem(RHS);
title(' RHS (x1[n] * x2[n]) * x3[n] ');
%Another express : x1[n] * x2[n]= x2[n] * x1[n]
LHS2=conv(X1,X2);
RHS2=conv(X2,X1);
subplot(4,1,3);
stem(LHS2);
title('LHS  x1[n] * x2[n]');
subplot(4,1,4);
stem(RHS2);
title(' RHS x2[n] * x1[n] ');
```

OUPUT:

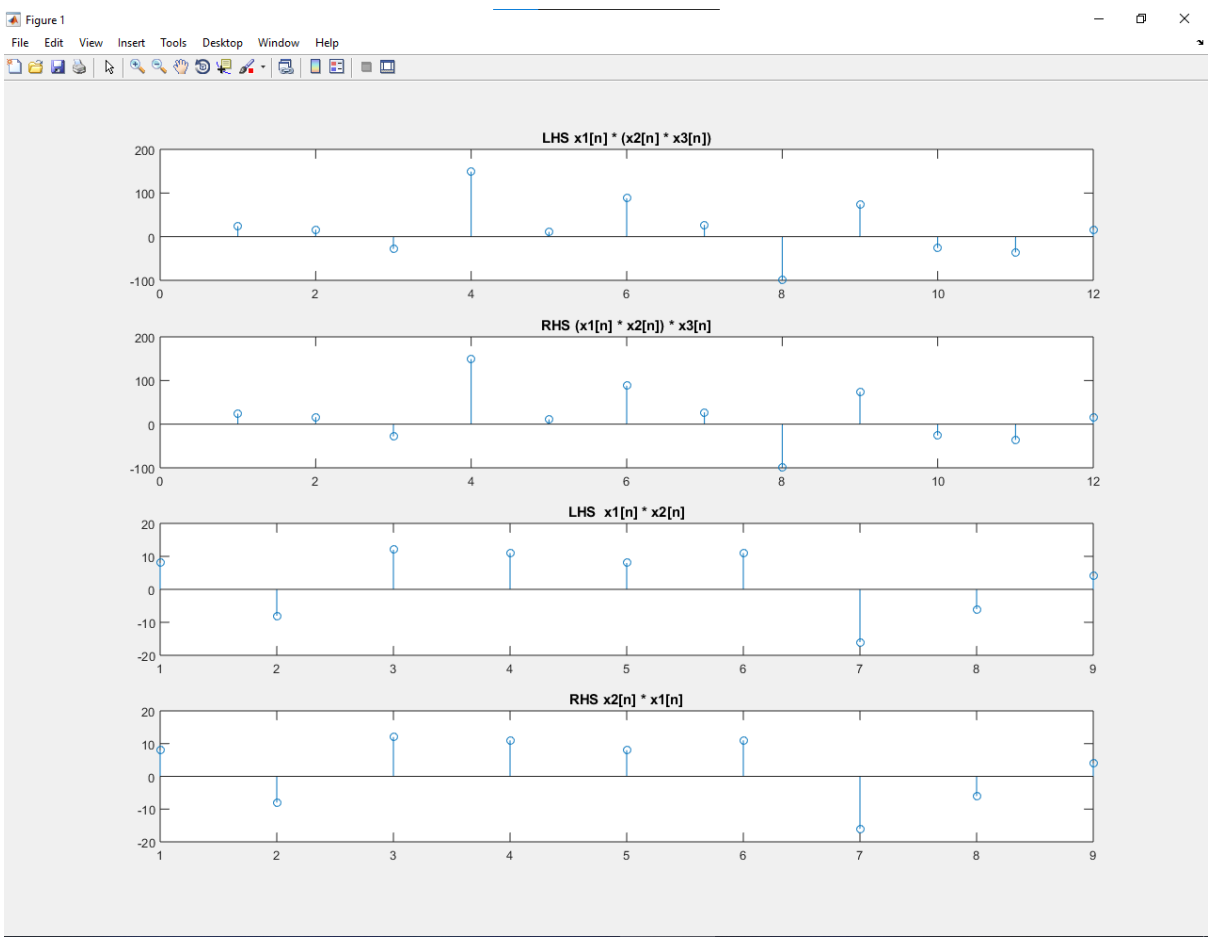


Figure 1
File Edit View Insert Tools Desktop Window Help
LHS x1[n] * (x2[n] * x3[n])
RHS (x1[n] * x2[n]) * x3[n]
LHS x1[n] * x2[n]
RHS x2[n] * x1[n]