Heaven's Light is Our Guide

Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

Lab Reports

Course Title :   *Digital Signal Processing Sessional*

Course No: *ECE 4124*

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Experiment No: 01
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Experiment Name: Presentation of some signals using MATLAB.

1. Plot unit step, unit impulse and unit ramp signal using conditions.
2. Plot a discrete signal.
3. Plot two discrete signal, their addition and subtraction.
4. Plot two given continuous signal.

Theory:

The unit step signal, denoted as u[n], is a discrete-time signal that takes the value 1 for all non-negative integers and 0 for all negative integers.

u[n] = 1, for n ≥ 0

u[n] = 0, for n < 0

The unit ramp signal, denoted as r[n], is a discrete-time signal that starts from 0 at n = 0 and increases by 1 unit for each integer value of n.

r[n] = 0, for n < 0

r[n] = n, for n ≥ 0

The unit impulse signal, denoted as δ[n], is a discrete-time signal that takes the value 1 only at n = 0 and is 0 for all other values of n.

δ[n] = 1, for n = 0

δ[n] = 0, for n ≠ 0

A discrete-time signal is a type of signal that is defined only at specific, distinct points in time. In other words, it is a signal whose values are known and represented at specific discrete time instants. Discrete-time signals are often used in various fields of engineering, mathematics, and signal processing for analysis, manipulation, and communication.

Software Used: MATLAB

Code:

Unit step, unit impulse and unit ramp signal plotting code:
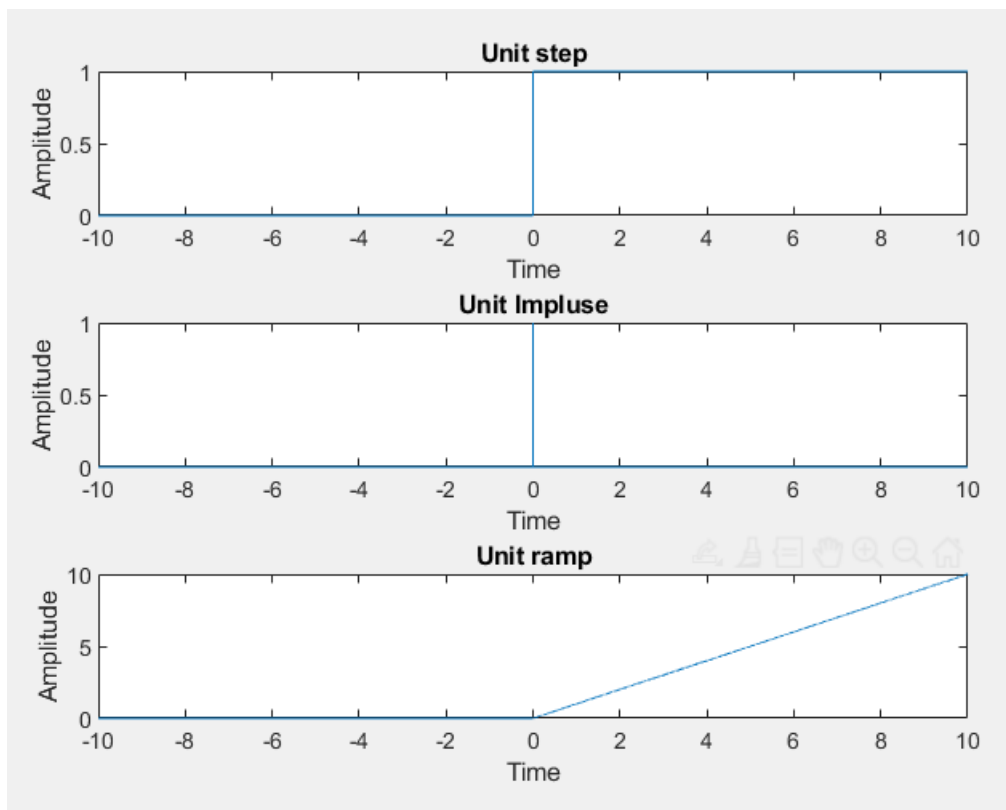
```
1.  clc;
2.  clear all;
3.  close all;
4.
5.  t=-10:0.001:10;
6.  step= t>= 0;
7.  impulse= t==0;
8.  ramp= (t>=0).*t;
9.
10. subplot(3,1,1);
11. plot(t,step);
12. xlabel('Time');
13. ylabel('Amplitude');
```

```
14. title('Unit step');
15.
16. subplot(3,1,2);
17. plot(t,impulse);
18. xlabel('Time');
19. ylabel('Amplitude');
20. title('Unit Impluse');
21.
22. subplot(3,1,3);
23. plot(t,ramp);
24. xlabel('Time');
25. ylabel('Amplitude');
26. title('Unit ramp');
```
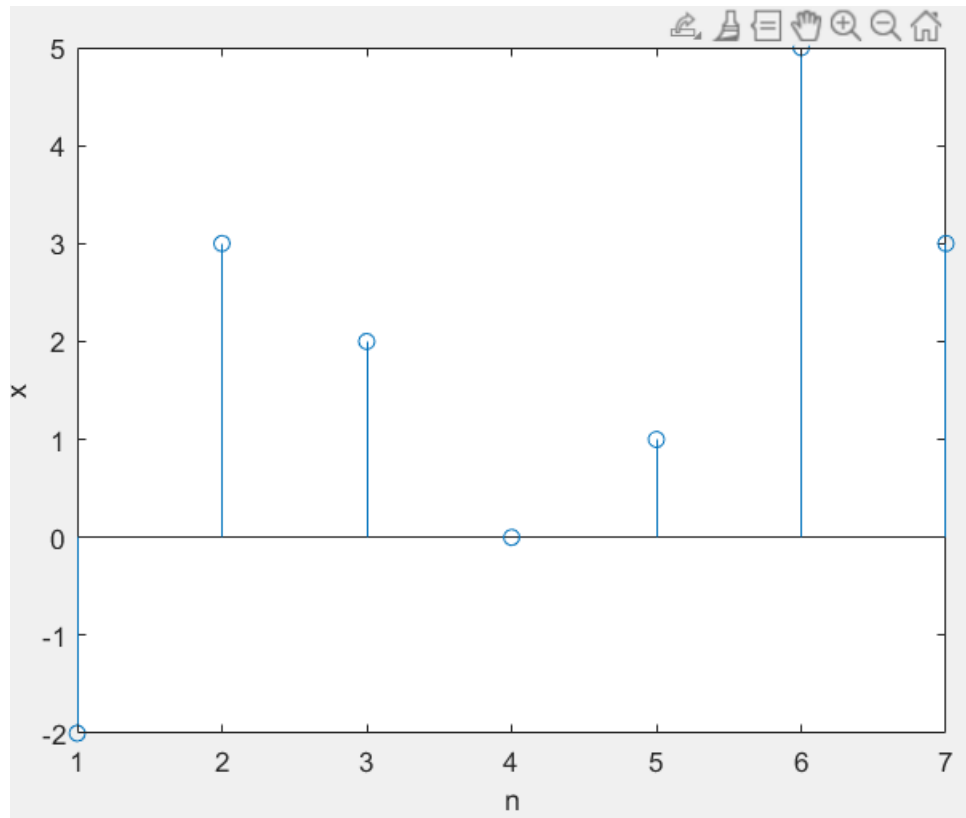
Plot:

Discrete signal plotting code:

```
1. clc;
2. clear all;
3. close all;
4.
5. x=[-2, 3, 2, 0, 1, 5, 3];
6. n=[1 2 3 4 5 6 7];
7. stem(n,x);
8. xlabel('n');
9. ylabel('x');
```

Plot:

Addition and subtraction of two signals plotting code:

```
1.  clc;
2.  clear all;
3.  close all;
4.
5.  t=-10:1:10;
6.  s1= t>=0 & t<=5;
7.  s2= t>=2 & t<=7;
8.
9.  subplot(4,1,1);
10. stem(t,s1);
11. xlabel('Time');
12. ylabel('Amplitude');
13. title('Signal 1');
14.
15. subplot(4,1,2);
16. stem(t,s2);
17. xlabel('Time');
18. ylabel('Amplitude');
19. title('Signal 2');
20.
21. step3 = s1+s2
22. subplot(4,1,3);
23. stem(t,step3);
24. xlabel('Time');
```

```
25. ylabel('Amplitude');
26. title('Addition');
27.
28. step4 = s1-s2
29. subplot(4,1,4);
30. stem(t,step4);
31. xlabel('Time');
32. ylabel('Amplitude');
33. title('Subtraction');
```

Plot:
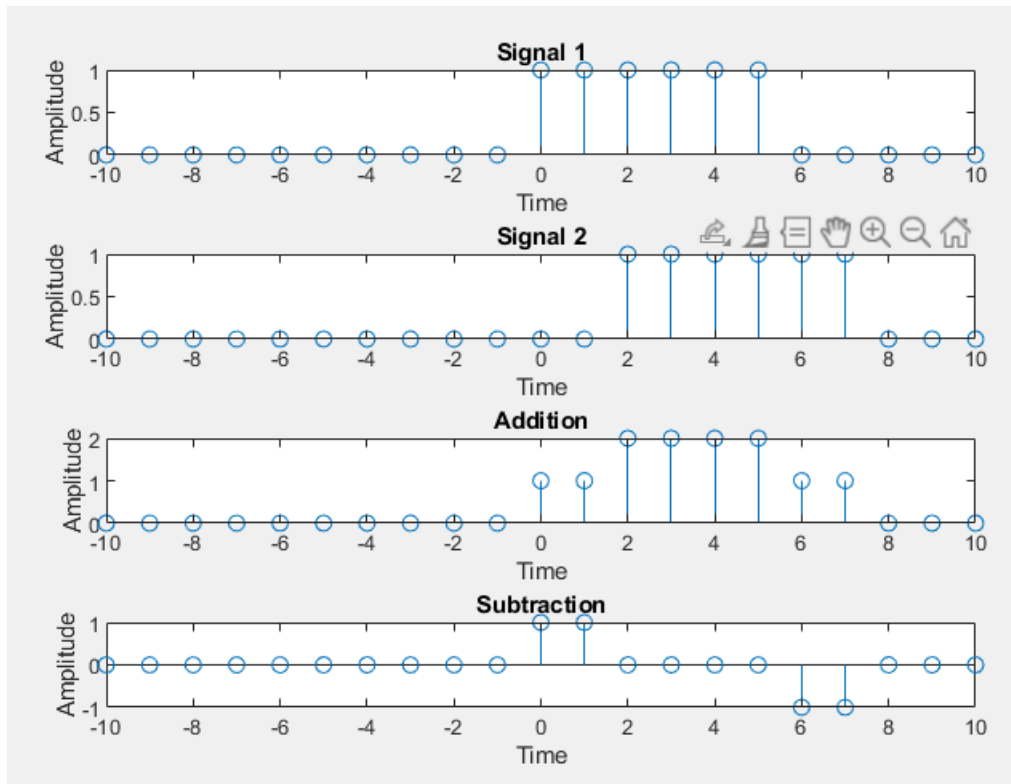
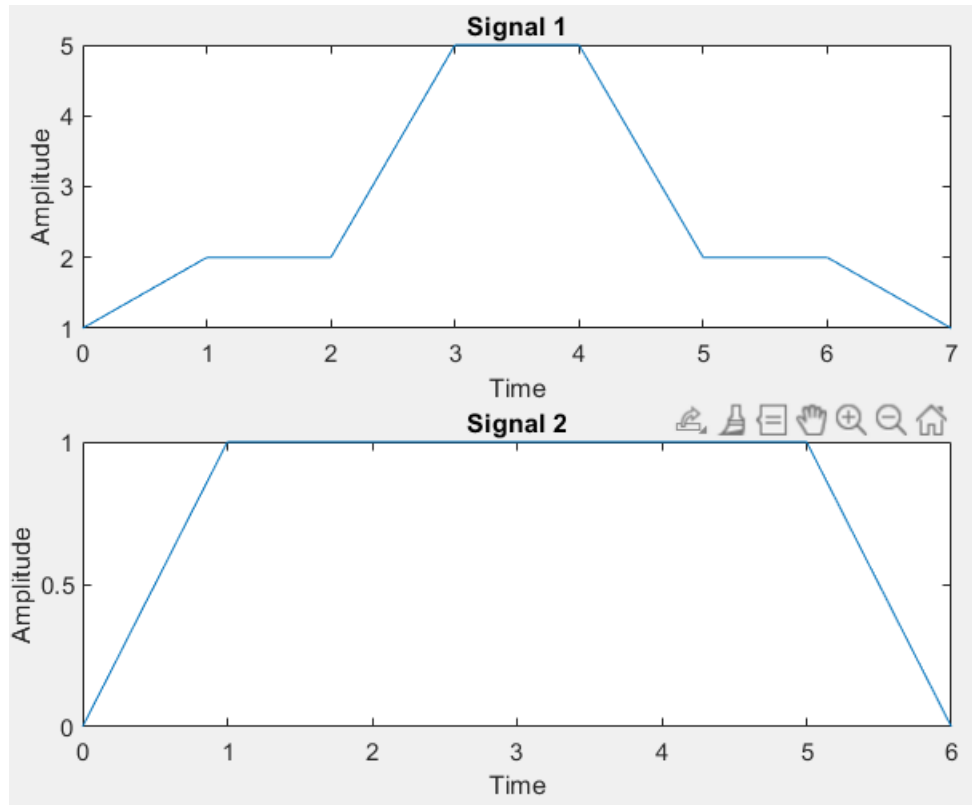
Plotting two signals:

```
1.  clc;
2.  clear all;
3.  close all;
4.
5.  t=0:1:7;
6.  u = [ones(1,1).*1 ones(1,2).*2 ones(1,1).*5 ones(1,1).*5 ones(1,2).*2 ones(1,1)];
7.  subplot(2,1,1);
8.  plot(t,u);
9.  xlabel('Time');
10. ylabel('Amplitude');
11. title('Signal 1');
12.
13. t=0:1:6;
14. u1 = [zeros(1,1) ones(1,5) zeros(1,1)];
15. subplot(2,1,2);
16. plot(t,u1);
```

```
17. xlabel('Time');
18. ylabel('Amplitude');
19. title('Signal 2');
```

Plot:

Discussion:

By using conditions, the unit step, unit impulse and unit ramp signals output had been shown. After that a discrete signal had been generated. Then for two signals the addition and subtraction had been performed. For the last code the plot did not came as per expectation.

Conclusion:

The experiment had been done well without any error and got the expected outcome but not for the last task given.