Experiment No: 01

Experiment Date: 20.03.2023

Experiment Name: MATLAB presentation of certain signals.

Theory:

In the experiment, we used both continuous and discrete signals. A signal that changes smoothly and continuously across time is said to be continuous-time. These signals indicate a level of interest that is influenced by an external element, usually time. An intriguing sequence of values makes up a discrete-time signal, and the integer index can be thought of as a time index. The values in the sequence relate to some meaningful physical characteristic.

The step signal, often known as the step function, is a typical signal type that only occurs in positive time and is zero in negative time. A step signal is referred to as a unit step signal or unit step function if its magnitude is one. u(t) indicates it.

Except at t = 0, the unit impulse signal has zero amplitude everywhere else. The area under the curve is equal to one because the amplitude of the impulse signal is infinite at the origin (t = 0). The symbol for it is (t).

Frequently referred to as a ramp signal, a ramp function is a type of standard signal that starts at time zero and rises linearly in time. The slop of the ramp function is one unit. R is used to denote it (t).

Required software: MATLAB

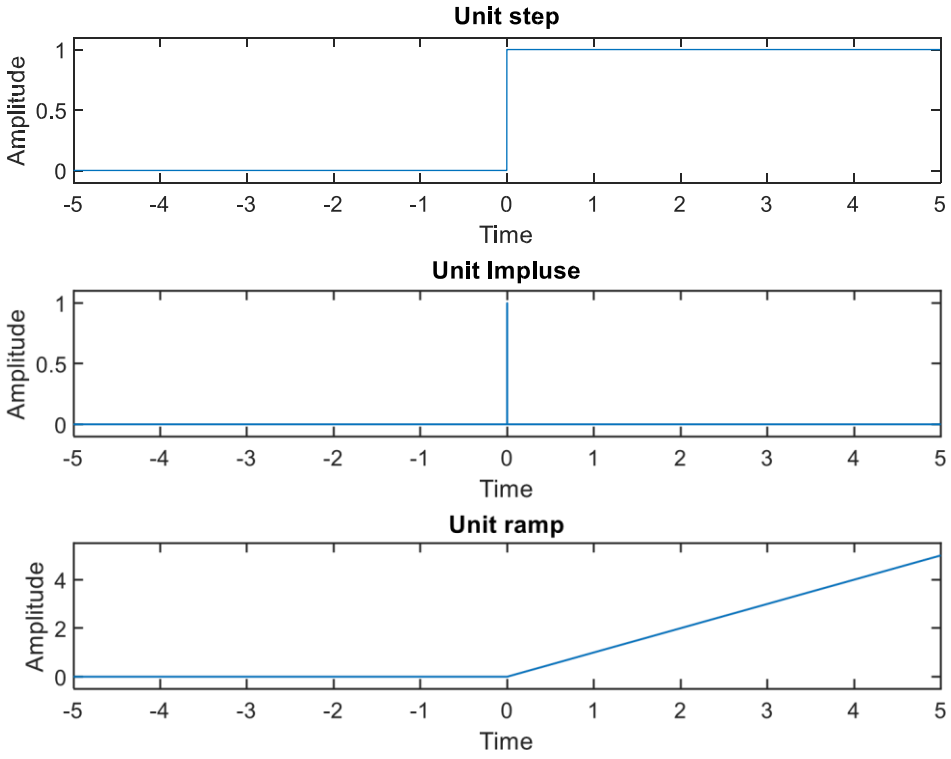
Code:

Code 1: Unit step, unit impulse and unit ramp-

```
clc;
clear all;
close all;
t=-5:0.001:5;
step1= t>= 0;
step2= t==0;
8. step3= (t>=0).*t;
subplot(3,1,1);  9. plot(t,step1);
xlabel('Time');
ylabel('Amplitude');
title('Unit step');
```

```
15. ylim([-0.1, 1.1]);
subplot(3,1,2);
plot(t,step2);
xlabel('Time');
ylabel('Amplitude');
title('Unit Impluse');
22. ylim([-0.1, 1.1]);
subplot(3,1,3);
plot(t,step3);
xlabel('Time');
ylabel('Amplitude');
title('Unit ramp');
ylim([-0.5, 5.5]);
```

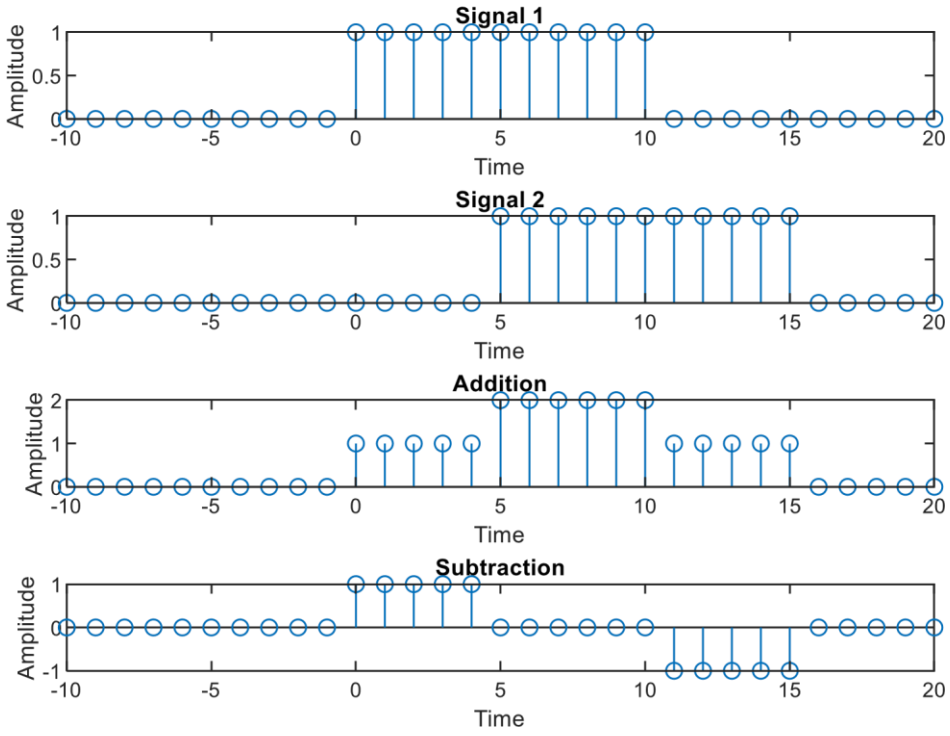
Output:



Code 2: Two different signals, their addition and subtraction-

```
clc;
clear all;
close all;
t=-10:1:20;
step1= t>=0 & t<=10;
step2= t>=5 & t<=15;
subplot(4,1,1);  8. stem(t,step1);
xlabel('Time');
ylabel('Amplitude');
13. title('Signal 1');
subplot(4,1,2);
stem(t,step2);
xlabel('Time');
ylabel('Amplitude');
title('Signal 2');
step3 = step1+step2
subplot(4,1,3);
stem(t,step3);
xlabel('Time');
ylabel('Amplitude');
title('Addition');
step4 = step1-step2
subplot(4,1,4);
stem(t,step4);
xlabel('Time');
ylabel('Amplitude');
title('Subtraction');
```

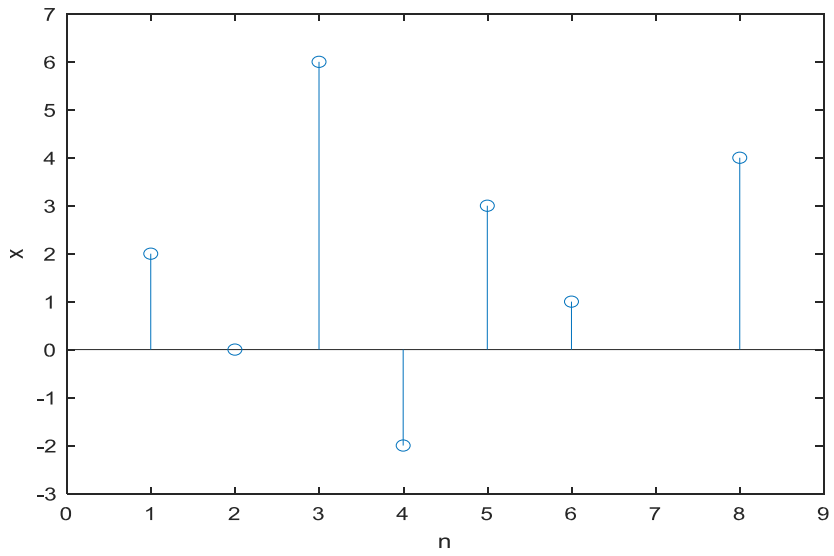
Output:


Signal 1
Amplitude
Time
Signal 2
Amplitude
Time
Addition
Amplitude
Time
Subtraction
Amplitude
Time

Code 3: Discrete signal -

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

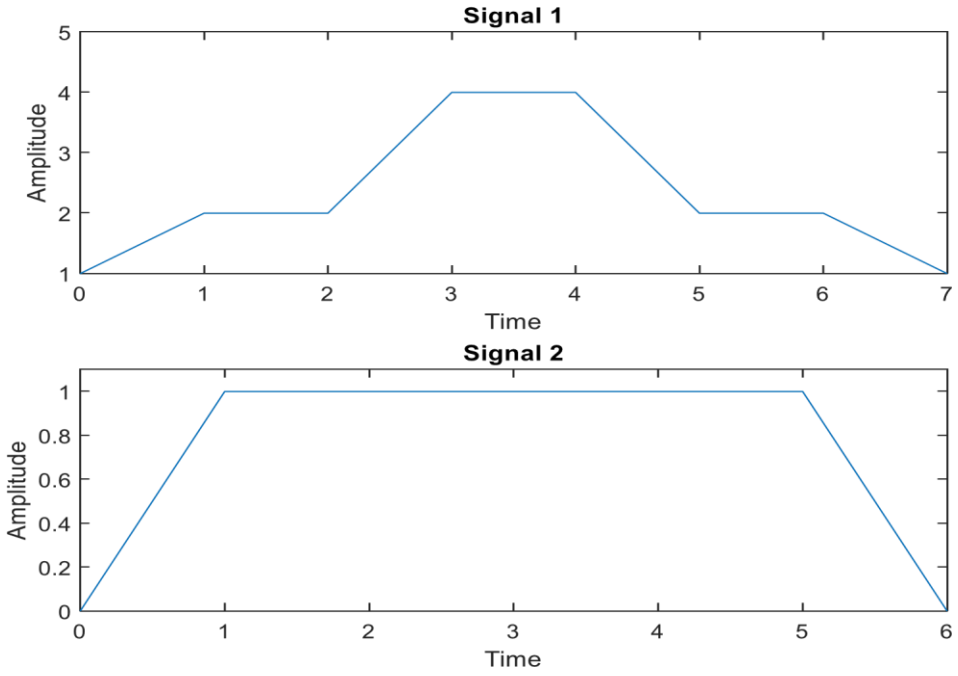
Output:



Code 4: Presentation of two signals-

```
clc;
clear all;
close all;  4.
t=0:1:7;
u = [ones(1,1).*1 ones(1,2).*2 ones(1,1).*4 ones(1,1).*4 ones(1,2).*2
ones(1,1)];
subplot(2,1,1);  8. plot(t,u);
xlabel('Time');
ylabel('Amplitude');
title('Signal 1');
xlim=([0, 8]); 13. ylim([1, 5]);  14.
t=0:1:6;
u1 = [zeros(1,1) ones(1,5) zeros(1,1)];
subplot(2,1,2);  18. plot(t,u1);
xlabel('Time');
ylabel('Amplitude');
title('Signal 2');
xlim=([-0, 7]);
ylim([0, 1.1]);
```

Output:



Discussion:

Instead of using the built-in functions in this experiment, we used conditions to manipulate the unit step, unit impulse, and unit ramp signals. For a unit step, all values are zero before time zero and one after time zero. There is only one value for impulse that is zero; all other values are zero. The discrete plot was produced using the stem function.

We used two distinct signals and added and subtracted them in stages. In the final section of code, which graphs the two given signals, we constructed functions using ones and zeros. The first plot in code 4 was somewhat similar to the one shown, but not quite. The second delivered results that were comparable to the first.

Conclusion:

In the experiment, algorithms generated precise output graphs that corresponded to the functions and theoretical justifications given.