

Republic of Iraq  
Ministry of Higher Education  
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Al-Mustaqbal University College  
Computer Engineering Techniques Department



(عملي)

**Subject: Digital Signal Processing**

**Third stage**

**Experiment No. 2**

**By**

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## Experiment No.2

**Name of Experiment:** Generation of Elementary Discrete Time Signals  
(Part 1)

**Aim:** develop some elementary discrete time (DT) signals.

**Theory:-**

A discrete-time signal is an indexed sequence of real or complex numbers. Thus, a discrete-time signal is a function of an integer-valued variable  $n$ , that is denoted by  $x[n]$ . Although the independent variable  $n$  need not necessarily represent "time" ( $n$  may, for example, correspond to a spatial coordinate or distance),  $x[n]$  is generally referred to as a function of time. Therefore, a real-valued signal  $x[n]$  will be represented as shown in Figure below.

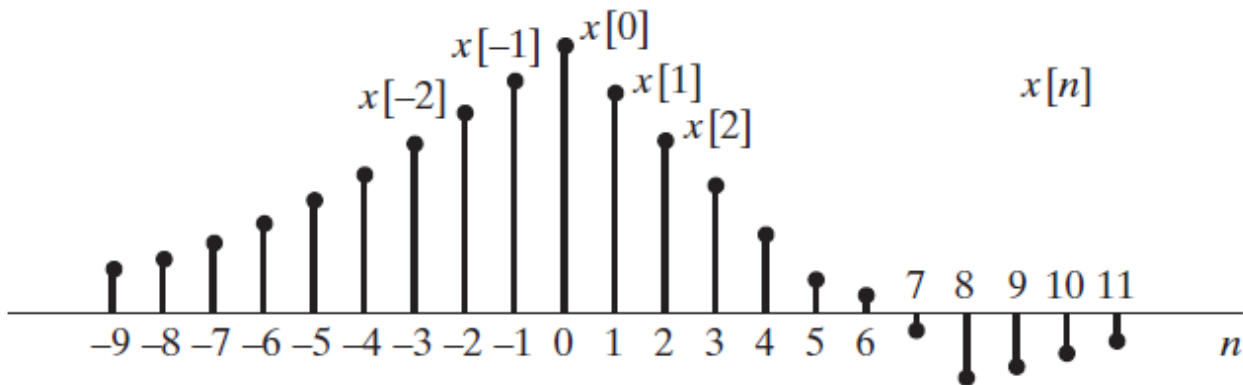


Fig . Graphical representation of a discrete-time signal.

The elements of the sequence are called *samples*. The index  $n$  associated with each sample is an integer. If appropriate, the range of  $n$  will be specified.

## Procedure:

### a- Sinusoidal DT signal

```
clc;
clear all;
close all;
N = input('Enter Number of Samples : ');
n = 0:0.1:N;
x = sin(n);
stem (n,x);
xlabel ('Time');
ylabel ('Amplitude');
title ('Discrete Time Sine Signal');
grid on;
```

### b- Square DT signal

```
clc;
clear all;
close all;
N = input('Enter the number of Samples:');
n = 0:0.1:N;
s = square(2*n);
stem (n,s);
xlabel ('time');
ylabel ('amplitude');
title ('square wave')
grid on;
```

c- Complex DT signal  $y = e^{(-0.2+2i)n}$

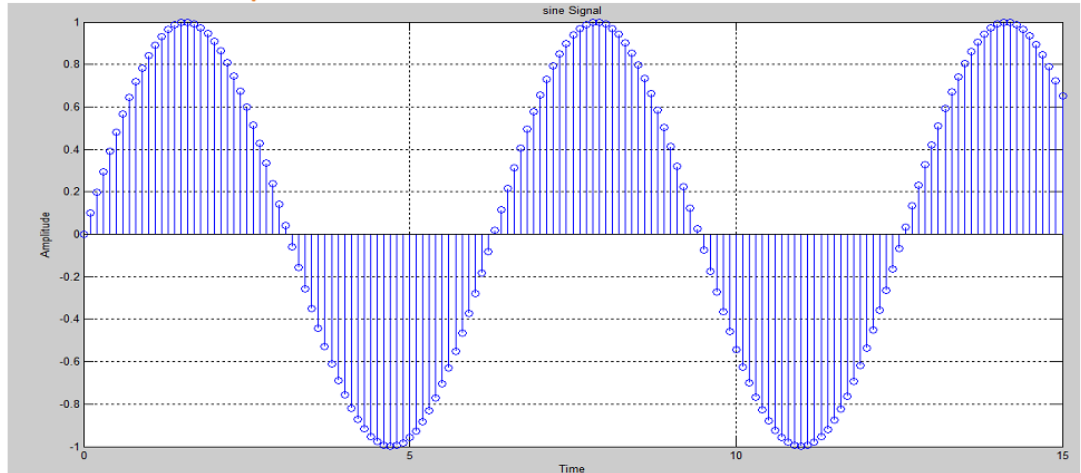
```
clc;  
clear all;  
close all;  
n = 0 : 0.1 : 15;  
y = [exp((-0.2+2*i)*n)];  
stem (n,y,'r');  
xlabel ('time');  
ylabel ('amplitude');  
title ('Discrete Time Complex wave')  
grid on;
```

## Result

a- Sinusoidal DT signal

Output:

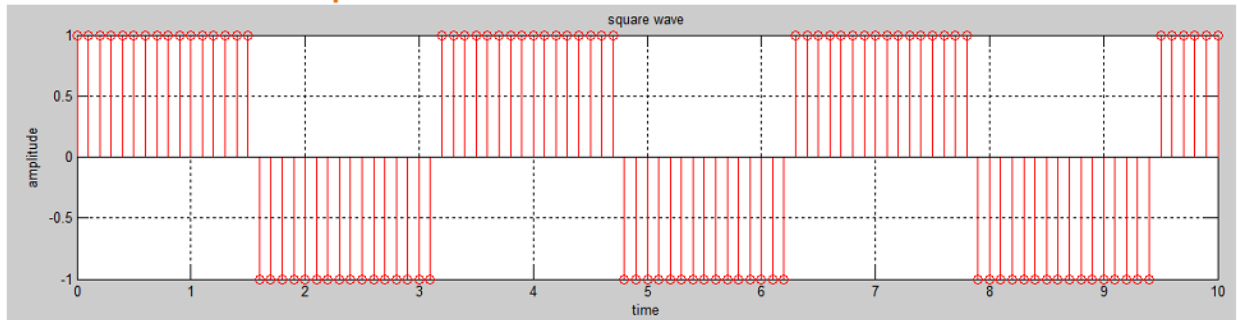
Enter Number of Samples : 15



b- Square DT signal

**Output:**

**Enter the number of Samples : 10**



c- Complex DT signal

