

Lab 1

INTRODUCTION TO DSP TOOLS

Objectives:

- To learn about the basic tools used in DSP.
- To understand the working of various waves and how to use them.

Theory:

MATLAB

The name MATLAB stands for MATrix LABoratory. MATLAB was written originally to provide easy access to matrix software developed by the LINPACK (linear system package) and EISPACK (Eigen system package) projects. MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. MATLAB is basically used in data analysis and processing, exploration, visualization etc.

Millions of engineers and scientists worldwide **use MATLAB** for a range of applications, in industry and academia, including deep learning and machine learning, signal processing and communications, image and video processing, control systems, test and measurement, computational finance, and computational biology.

Some basics of MATLAB are:

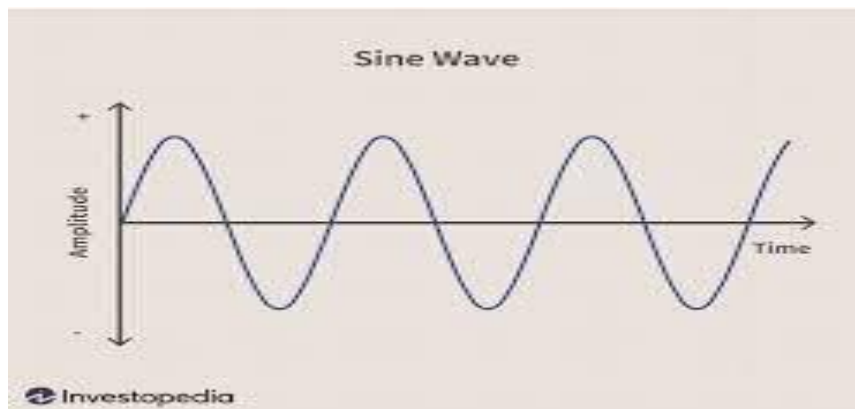
- Contents
- Vectors
- Plotting

- Functions
- Polynomials as vectors
- Matrices

Waves

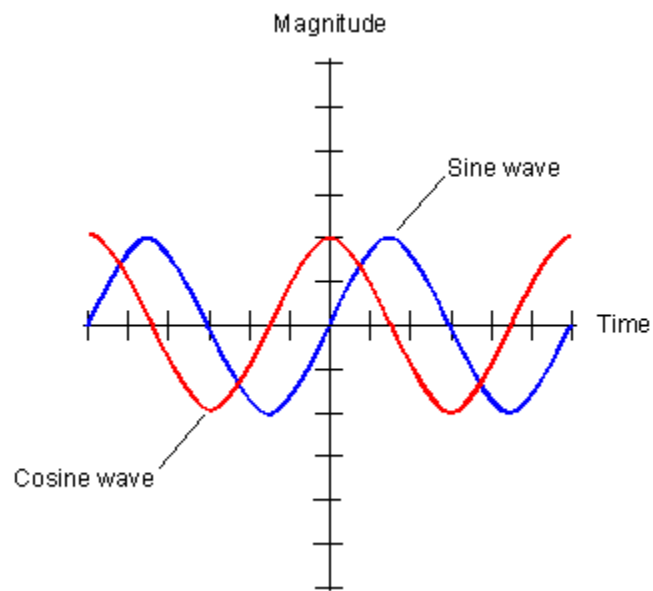
Sine wave

A sine wave is a geometric waveform that oscillates (moves up, down or side-to-side) periodically, and is defined by the function $y = \sin x$. In other words, it is an s-shaped, smooth wave that oscillates above and below zero.



Cosine wave

A cosine wave is a signal waveform with a shape identical to that of a sine wave , except each point on the cosine wave occurs exactly $1/4$ cycle earlier than the corresponding point on the sine wave.



In octave online,

1. $X=4$

$$Y=5$$

$$X+Y=9$$

2. $X*Y=20$

3. $X/Y=$

4. $Y/X=$

5. $Pi=3.1415$

Format long

$$Pi=3.141523456575$$

Format short

$$Pi=3.1415$$

6. Clc

7.clear all

8. $z=1-i$

Real $z=1$

Real(z)= 1

Imag(z)= -1

Conj(z)= $1+i$

Abs(z)= 1.414

Angle(z)= -0.7854

9. $\sin(45)=0.707$

10.rad2deg(ans)=-45

11. $x=[1,2,3,4]$

$X=1 \ 2 \ 3 \ 4$

$X=[1;2;3;4]$

$X=1$

2

3

4

12. $X=[1,2]$

$Y=[3,4]$

$X + Y=[4,6]$

$$13. X - Y = [-2, -2]$$

$$x \cdot y = [3, 8]$$

$$14. \text{transpose}(x) = 1$$

$$2$$

$$15. \text{clc}$$

$$16. \text{clear all}$$

$$X = \text{undefined}$$

$$17. x = 4;$$

$$18. y = 5;$$

$$x + y = 9$$

$$19. x/y = 0.8000$$

$$20. \text{Floor}(2.1456) = 2$$

$$21. \text{ceil}(2.1486) = 3$$

$$22. \text{round}(2.1486) = 2$$

$$23. \text{round}(2.6664) = 3$$

Q1.

Clc

Close all

A=5;

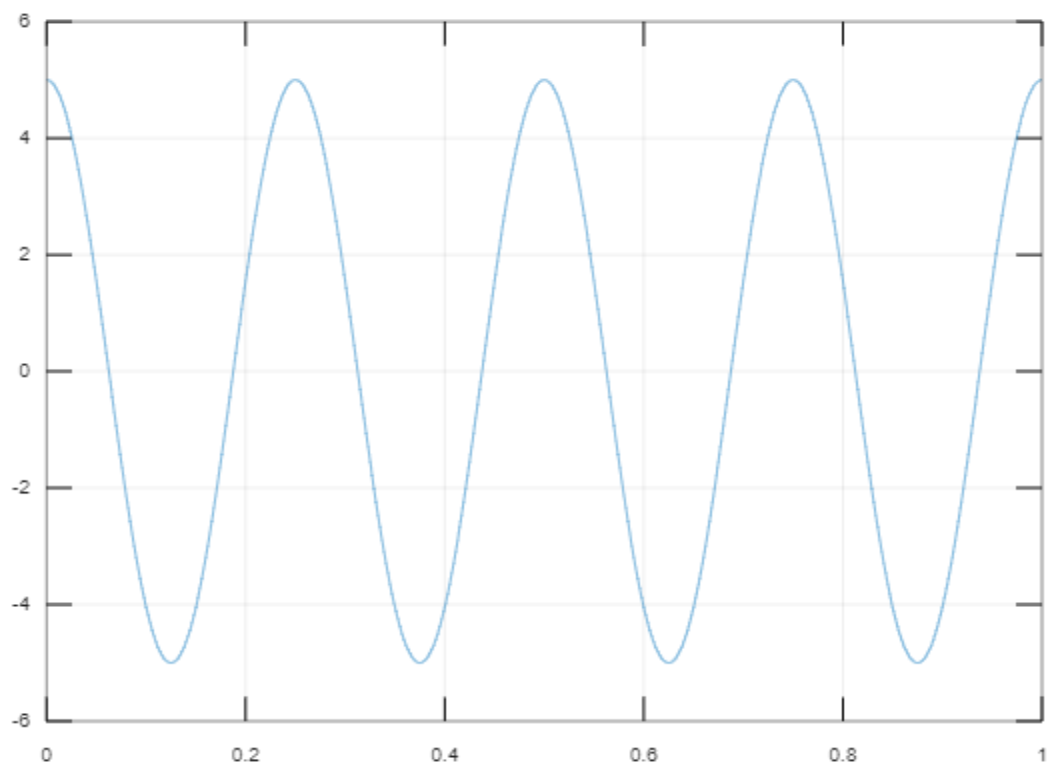
f=4;

t=0:0.001,1;

X=A*cos(2*pi*f*t);

Plot(t,x);

Grid on;



Q2.

Clc

Close all

A=5;

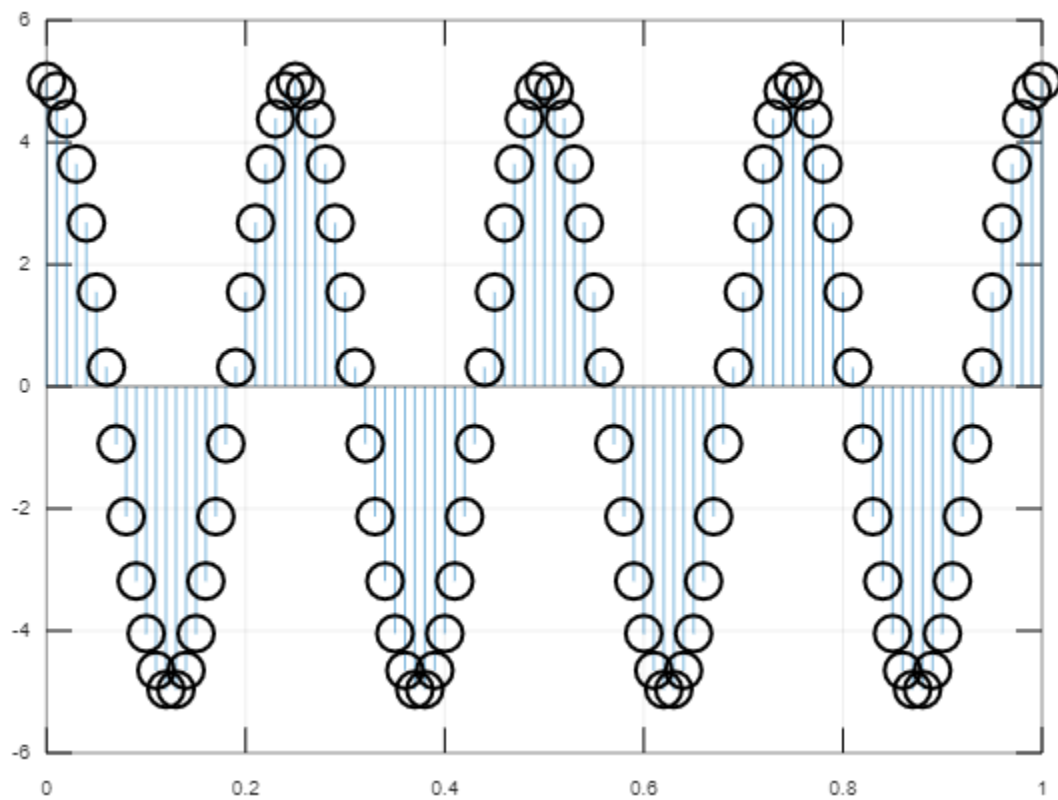
f=4;

t=0:0.01,1;

$X=A*\cos(2*\pi*f*t);$

stem(t,x);

Grid on;



Q3.

Clc

Close all

A=5;

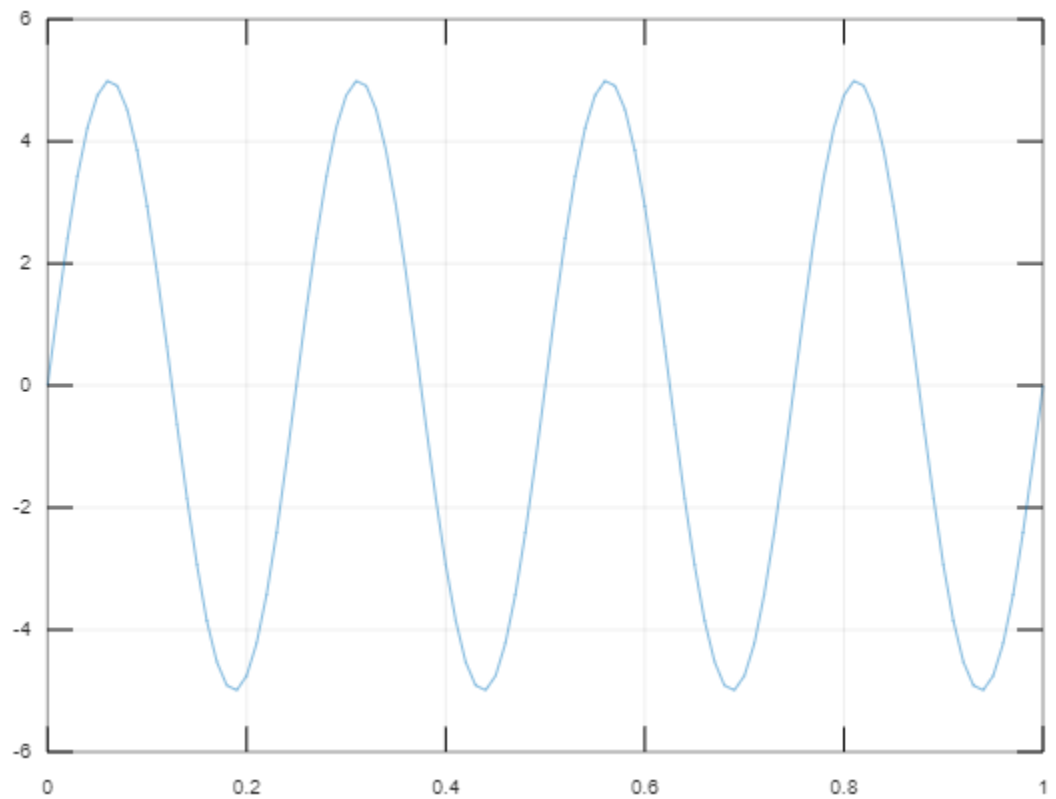
f=4;

t=0:0.001,1;

X=A*sin(2*pi*f*t);

plot(t,x);

Grid on;



Q4.

Clc

Close all

A=5;

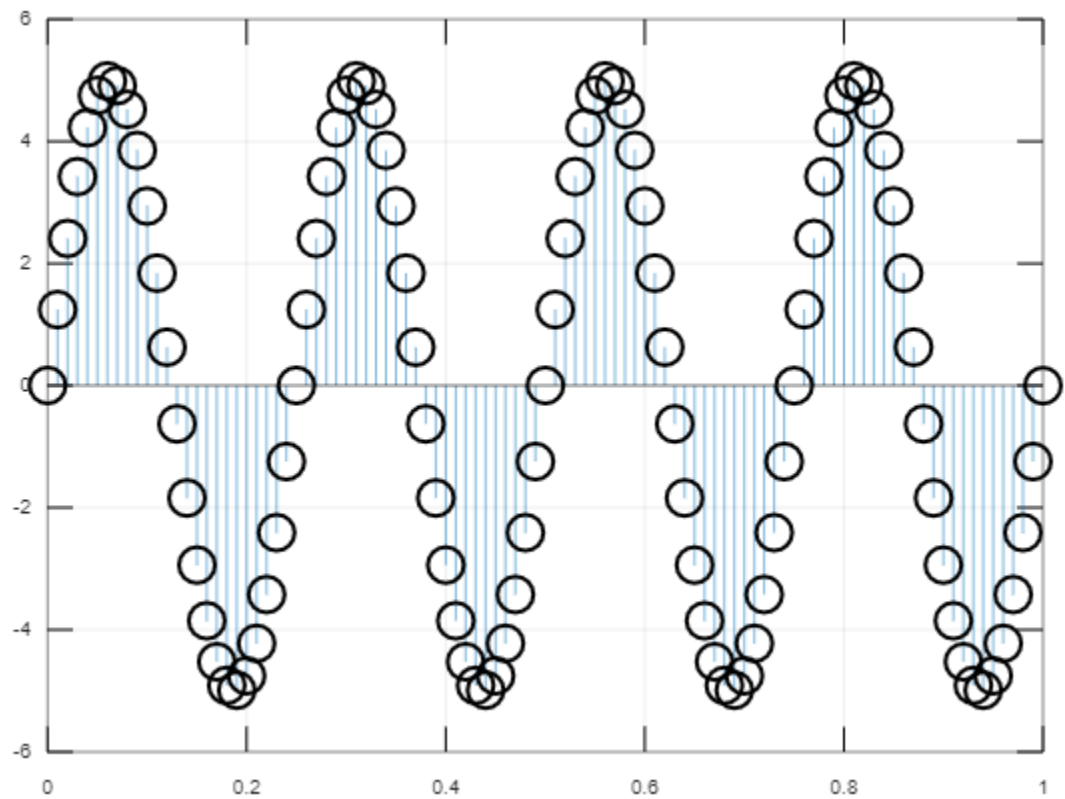
f=4;

t=0:0.01,1;

X=A*sin(2*pi*f*t);

stem(t,x);

Grid on;



DISCUSSION AND CONCLUSION

In this lab, we learnt about the basic tools of DSP and also learnt how to use them in various functions. Also we studied about some MATLAB operations and performed some tasks related to them.