BCA First Semester

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MatLab 2020 LabReport

Mathematics I

BCA Notes Nepal

We are sharing labreport of matlab, mathematics I, BCA First semester

Tribhuvan University

College Name

Location

Lab Reports of Mathematics-I (CAMT 104)

Department of Bachelor in Computer Application
Faculty of Humanities and Social Science
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Abstract

It's our pleasure and duty to submit report of MATLAB. It is the syllabus of BCA first semester program affiliated to Tribhuvan University. The main goal of this lab report is to make students understand about practical knowledge and concept of MATLAB about how to solve mathematical problem in lab. This is the main point of view of this report.

Acknowledgement

It was really an awesome experience to be a participant in the project work. I really enjoyed using my earned knowledge and experience in the lab to accomplish the project work. As I have done my best, I hope it will produce an outstanding result.

In course of being involved in project work I got lots of help and support from my teacher, colleges, friends and my seniors. So, I can't remain without thanking them for their seen and books proved to be milestone to me to accomplish the project work.

At last I would like to thank my classmates and teacher for their enormous support to complete the project.

Contents

1-INTRODUCTION

1.1-What is MATLAB?

MATLAB is a programming platform designed specifically for engineers and scientists to analyze and design systems and products that transform our world. The heart of MATLAB is the MATLAB language, a matrix-based language allowing the most natural expression of computational mathematics.

1.2-What can I do with MATLAB?

- Analyze data
- Develop algorithms,
- Create models and applications etc.

MATLAB lets you take your ideas from research to production by deploying to enterprise applications and embedded devices, as well as integrating with Simulink and Model-Based Design.

1.3-Who uses the MATLAB?

Millions of engineers and scientists worldwide use MATLAB for a range of applications, in

2-COMMANDS IN MATLAB

S. N	Commands	Description/Functions
1.	**clc**	Clears the command window.
2.	**clear all**	Clears all variables in your workspace.
3.	**plot()**	Plots curves by inserting vectors of the same length in the function.
4.	**help**	The documentation on the usage of the function directly in your command window.
5.	**input()**	Prompts the user for an input.
6.	**run**	Runs another script within your script.
7.	**shg**	Displays the figure window instantaneously.
8.	**ones()**	Creates a vector or a matrix of ones.
9.	**zeros()**	Creates a vector or a matrix of zeros.
10.	**rand()**	Creates a random vector or a matrix.

3-What are the difference between Command window and M-files?

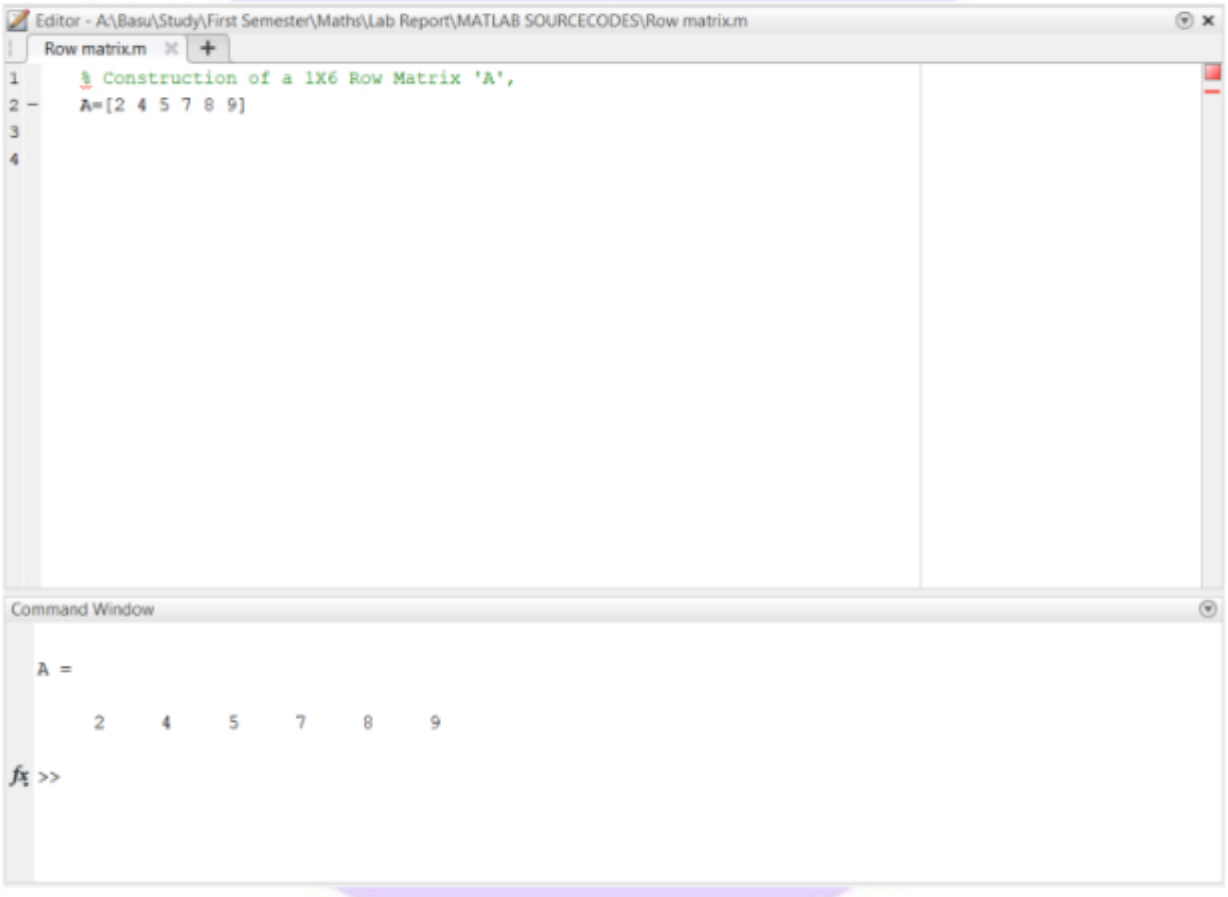
The difference between Command window and M-file are:

Command Window	M-Files
Command window is main window where you directly type commands.	M-files are script files which are written in editor window.
Command windows execute files directly.	M-files need to be saved first to execute them.
The commands cannot be edited once they are executed or enter is pressed.	The Commands can be edited whenever we want.
Command Window is faster than M-Files.	M-files is a bit slower than Command Window.
Commands in Command Windows Cannot be saved for future reference.	Commands in M-Files can be saved for future reference.

4-LAB REPORT

4.1: Construct a Row Matrix.

Ans:



4.2: Construct a Column Matrix.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Column Matrix.m

Column Matrix.m

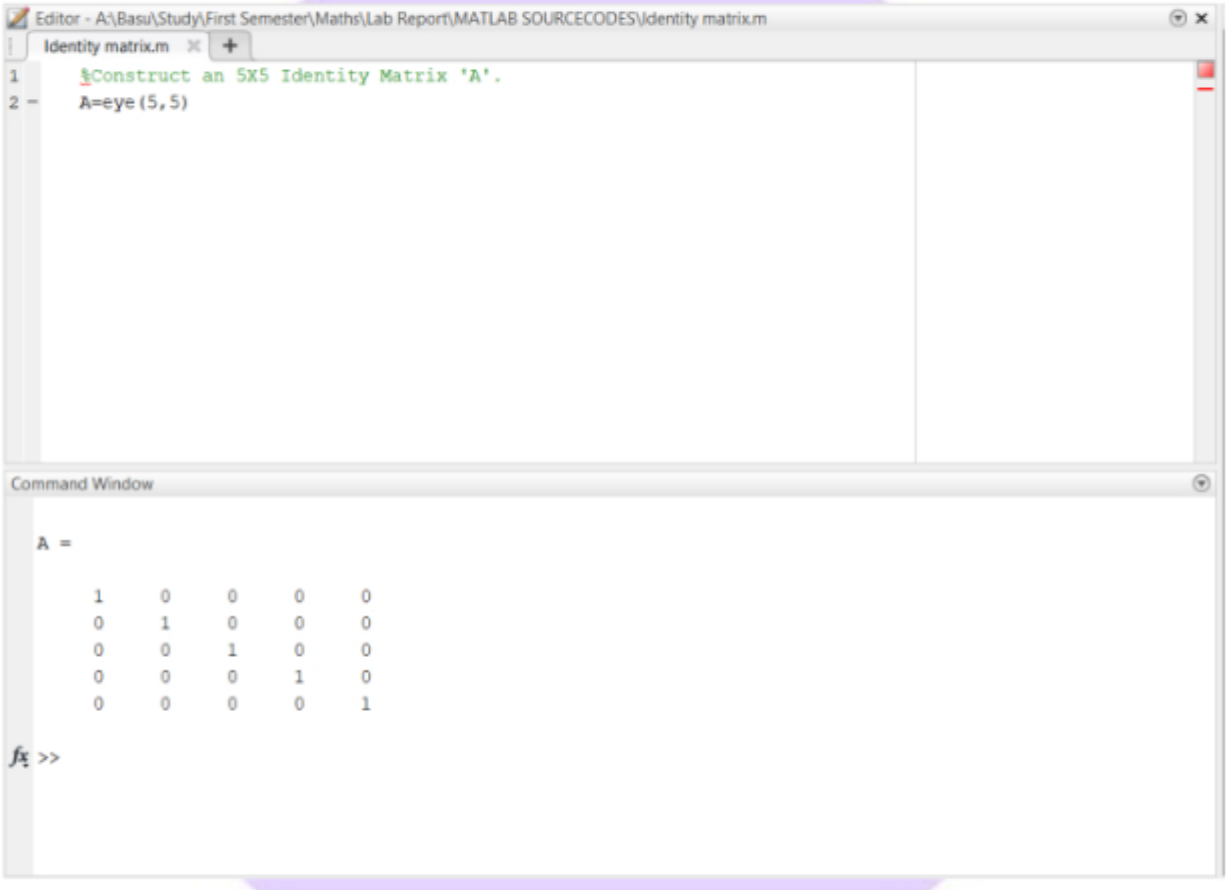
```
% Construction of a 6X1 Column Matrix 'A',
A=[4;5;3;8;10;12]
```

Command Window

```
A =

     4
     5
     3
     8
    10
    12

fx >>
```

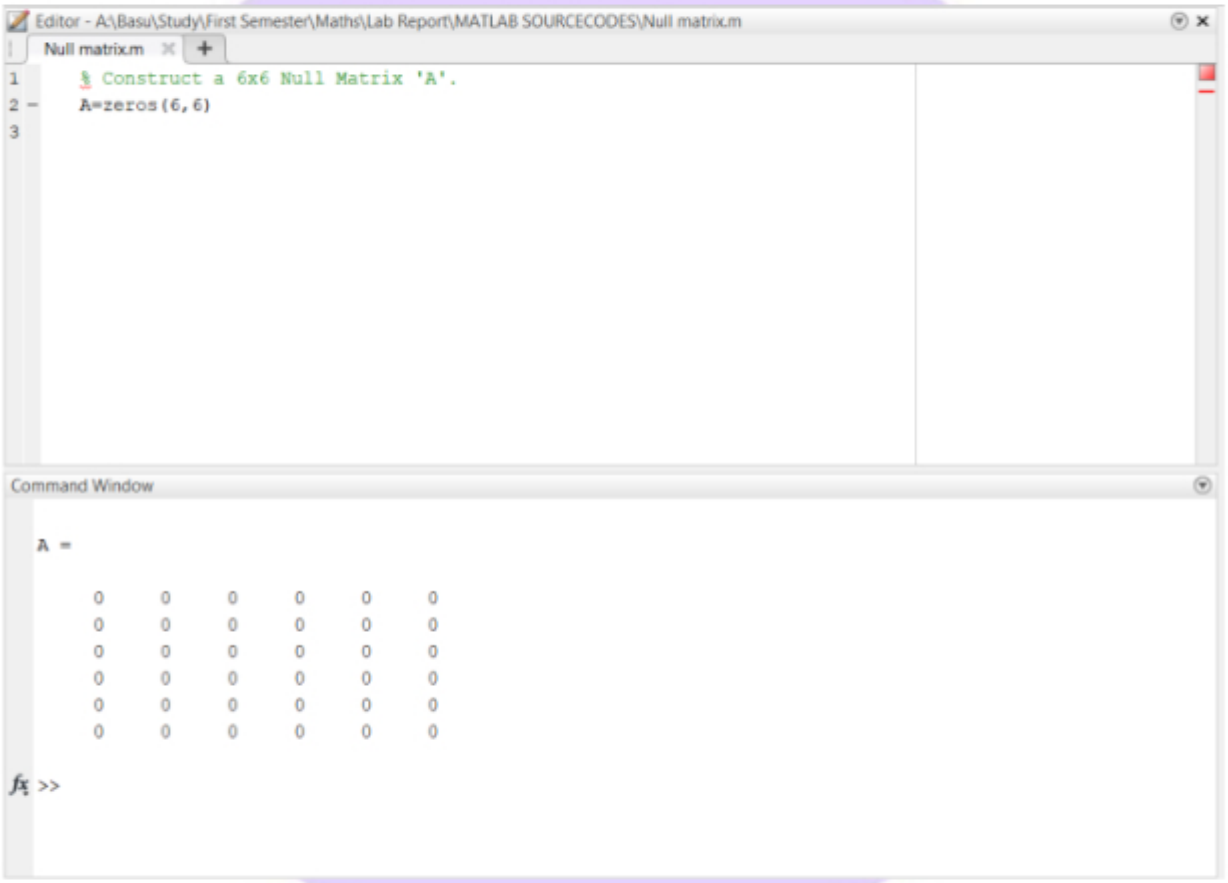
4.3: Construct an Identity Matrix.

Ans:



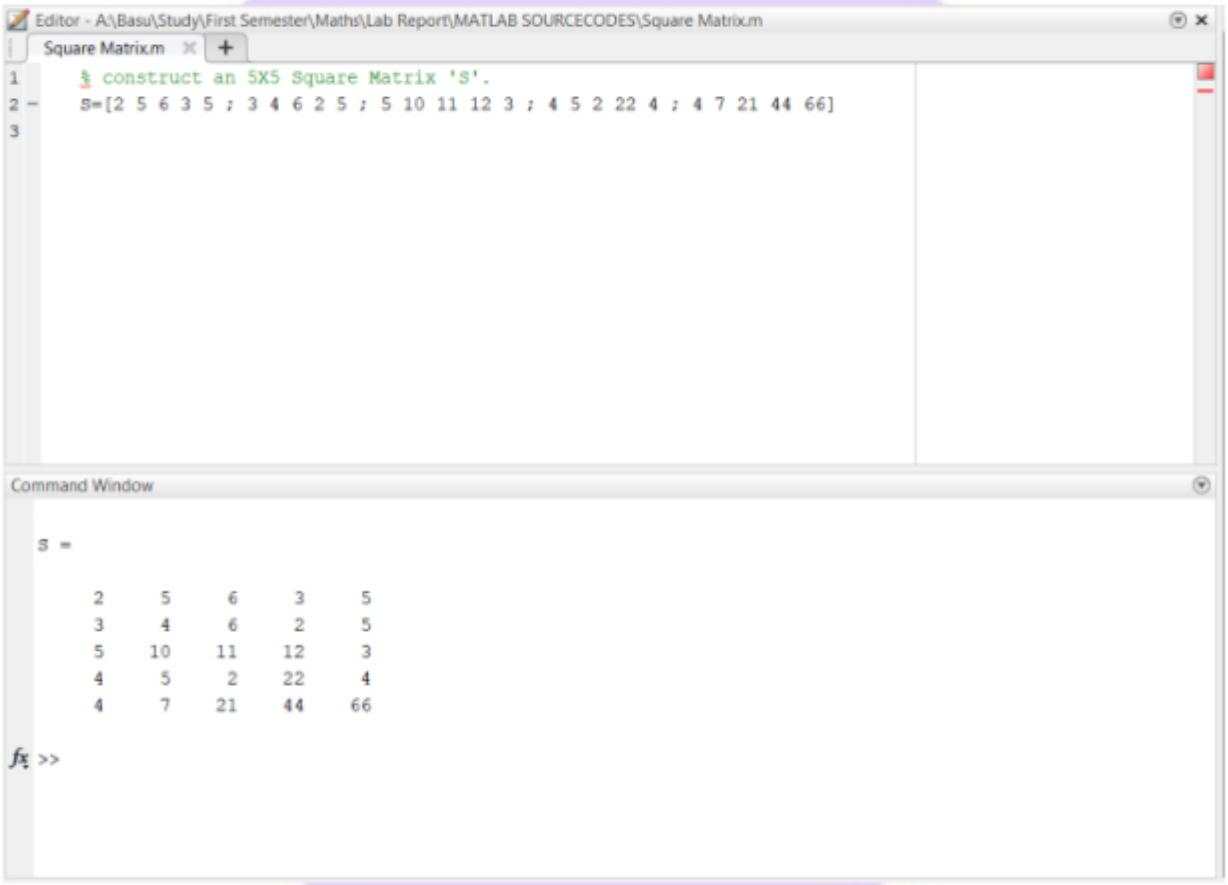
4.4: Construct a Null Matrix.

Ans:



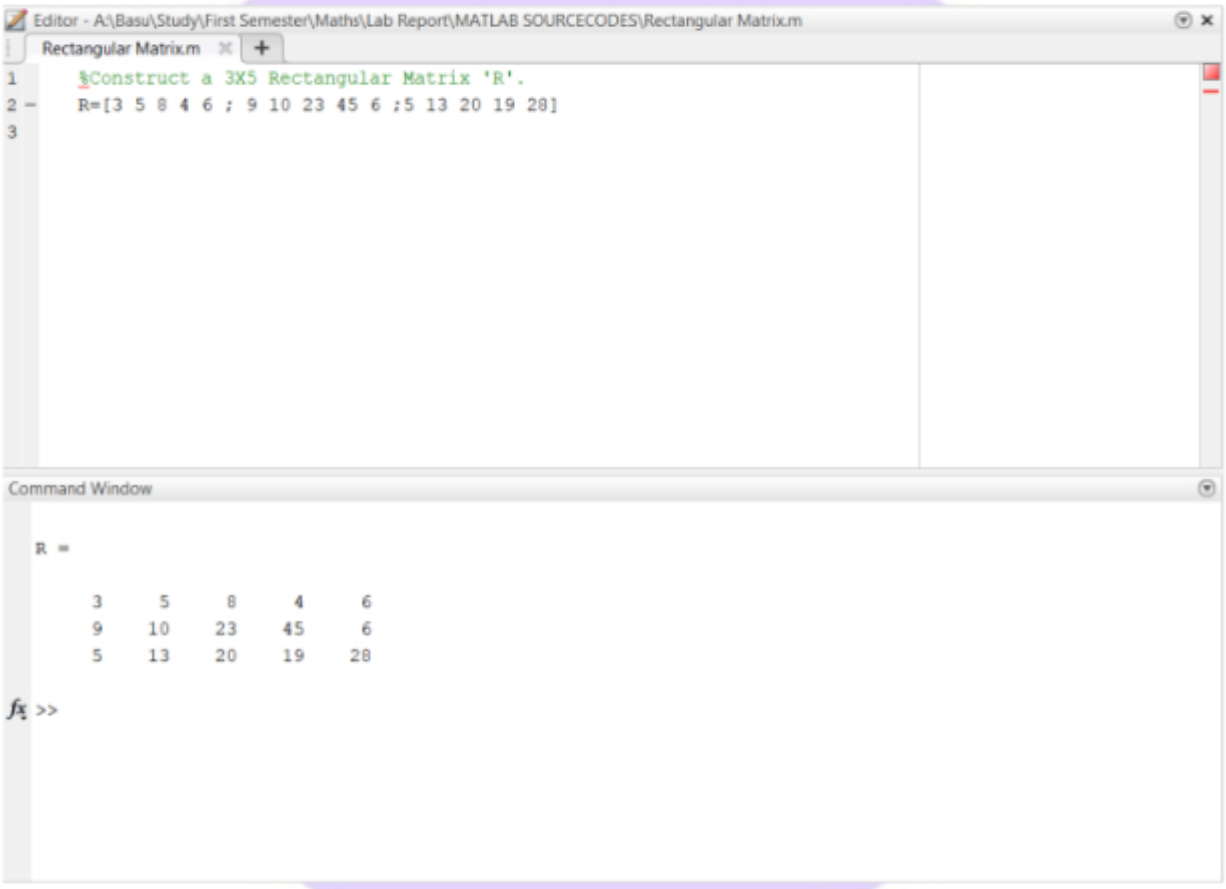
4.5: Construct a Square Matrix.

Ans:



4.6: Construct a Rectangular Matrix.

Ans:



4.7: Find the sum of two matrices.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Sum of two Matrices.m

Sum of two Matrices.m

```
% Addition of two Matrices:
%Let 'a' and 'b' be the two 3X3 matrices.
a=[2 4 6 ; 7 8 9 ; 10 11 12];
b=[1 3 5 ; 9 8 7 ; 4 5 6 ];
%If 's' be their sum.Then,
s=a+b
```

Command Window

```
s =

     3     7    11
    16    16    16
    14    16    18

fx >>
```

4.8: Find the sum of three matrices.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Sum of three Matrices.m

Sum of three Matrices.m

```
1    %Addition of three Matrices:
2    %Let 'a','b' and 'c' be the three 4X4 matrices.
3 -  a=[3 4 7 8 ; 5 7 0 5 ; 4 5 6 3 ; 2 4 6 7];
4 -  b=[2 4 5 6 ; 4 3 7 20 ; 5 6 2 2 ; 5 23 45 56];
5 -  c=[4 5 3 6 ; 3 2 45 56 ; 66 33 55 66 ; 44 23 46 76];
6    %If 's' be their Sum.Then,
7 -  s=a+b+c
```

Command Window

```
s =

     9    13    15    20
    12    12    52    81
    75    44    63    71
    51    50    97   139

fx >>
```

4.9: Find the difference between two matrices.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\difference between two Matrices.m

difference between two Matrices.m

```
1    % Difference between two Matrices:
2    %Let 'a' and 'b' be the two 3X3 matrices.
3 -  a=[2 4 4 ; 7 10 9 ; 10 4 12];
4 -  b=[1 4 5 ; 9 0 7 ; 2 5 5 ];
5    %If 'd' be their Difference.Then,
6 -  d=a-b
```

Command Window

```
d =

     1     0    -1
    -2    10     2
     8    -1     7

fx >>
```

4.10: Introduce the Product of two matrices.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Product of two Matrices.m

Product of two Matrices.m

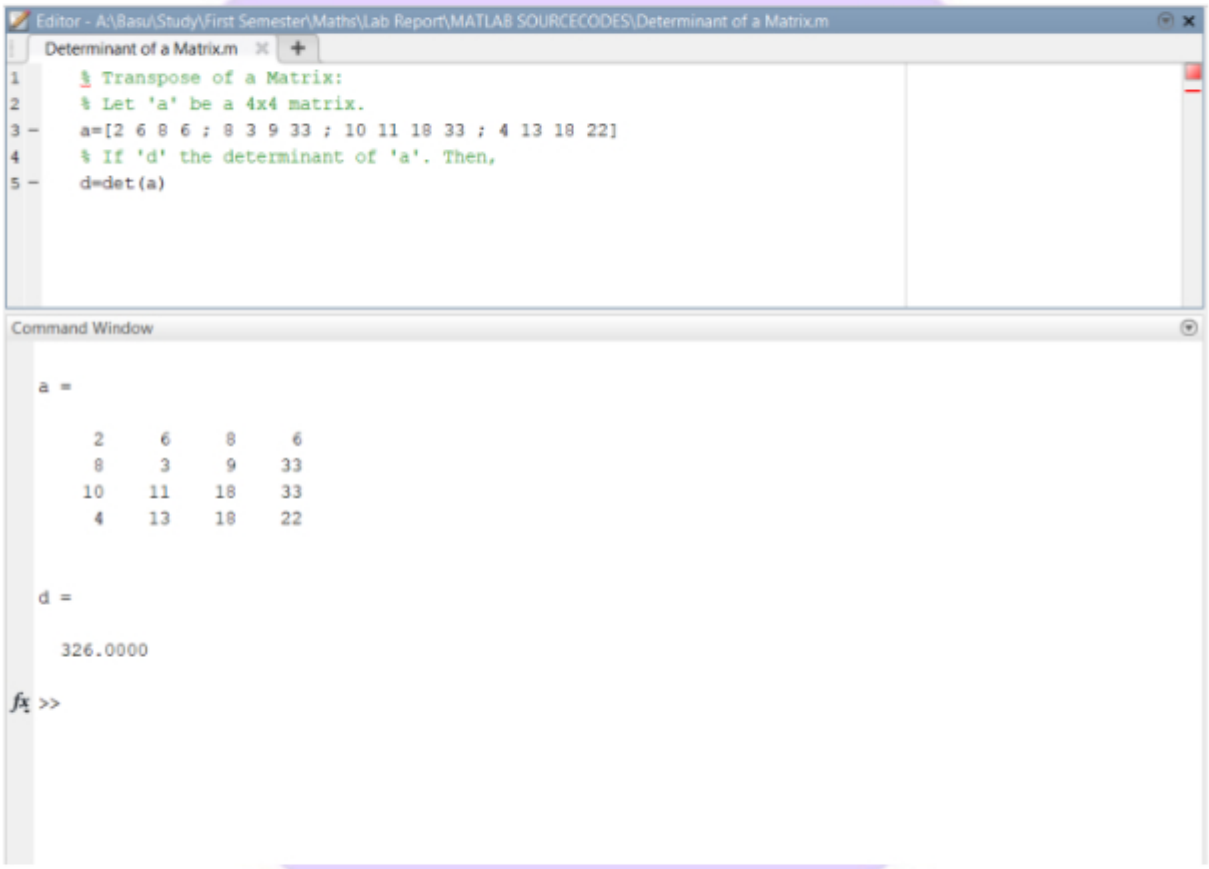
```
1     %Product of two Matrices:
2     %Let 'a' and 'b' be the two 3X4 and 4X2 matrices respectively.
3 -   a=[2 4 4 4 ; 7 10 9 4 ; 10 4 12 7];
4 -   b=[1 4 ; 9 0 ; 2 5 ; 4 7];
5     %If 'p' be their Product.Then,
6 -   p=a*b
```

Command Window

```
p =

    62    56
   131   101
    98   149

fx >>
```

4.11: Find the Determinant of given matrix.

Ans:



4.12: Find the Transpose of given matrix.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Transpose of a Matrix.m

Transpose of a Matrix.m

```
1    % Transpose of a Matrix:
2    % Let 'a' be a 4x4 matrix.
3 -  a=[2 6 8 6 ; 8 3 9 33 ; 10 11 18 33 ; 4 13 18 22]
4    % If 't' the determinant of 'a'. Then,
5 -  t=a'
```

Command Window

```
a =

     2     6     8     6
     8     3     9    33
    10    11    18    33
     4    13    18    22


t =

     2     8    10     4
     6     3    11    13
     8     9    18    18
     6    33    33    22

fx >>
```

4.13: Find the Inverse of given matrix.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Inverse of a matrix.m

Inverse of a matrix.m

```
1     % Inverse of a matrix:
2     % let 'a' be a 3x3 matrix,
3 -   a=magic(3)
4     % if 'I' be the Inverse of 'a'. Then,
5 -   I=inv(a)
```

Command Window

```
a =

     8     1     6
     3     5     7
     4     9     2


I =

    0.1472   -0.1444    0.0639
   -0.0611    0.0222    0.1056
   -0.0194    0.1889   -0.1028

fx >>
```

4.14: Find the Adjoint of given matrix.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Adjoint of a matrix.m

Adjoint of a matrix.m

```
1    % Adjoint of a matrix:
2    % let 'a' be a 3x3 matrix,
3 -  a=magic(3)
4    % if 'D' be the Determinant of 'a'. Then,
5 -  D=det(a);
6    % if 'I' be the Inverse of 'a'. Then,
7 -  I=inv(a);
8    % if 'A' be the Adjoint of 'a'. Then,
9 -  A=D*I
```

Command Window

```
a =

     8     1     6
     3     5     7
     4     9     2


A =

  -53.0000   52.0000  -23.0000
   22.0000   -8.0000  -38.0000
    7.0000  -68.0000   37.0000

fx >>
```

4.15: Solve the system of Linear equations involving 2 variables.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Solve the system of linear equations involving 2 variable.m

Solve the system of linear equations involving 2 variable.m

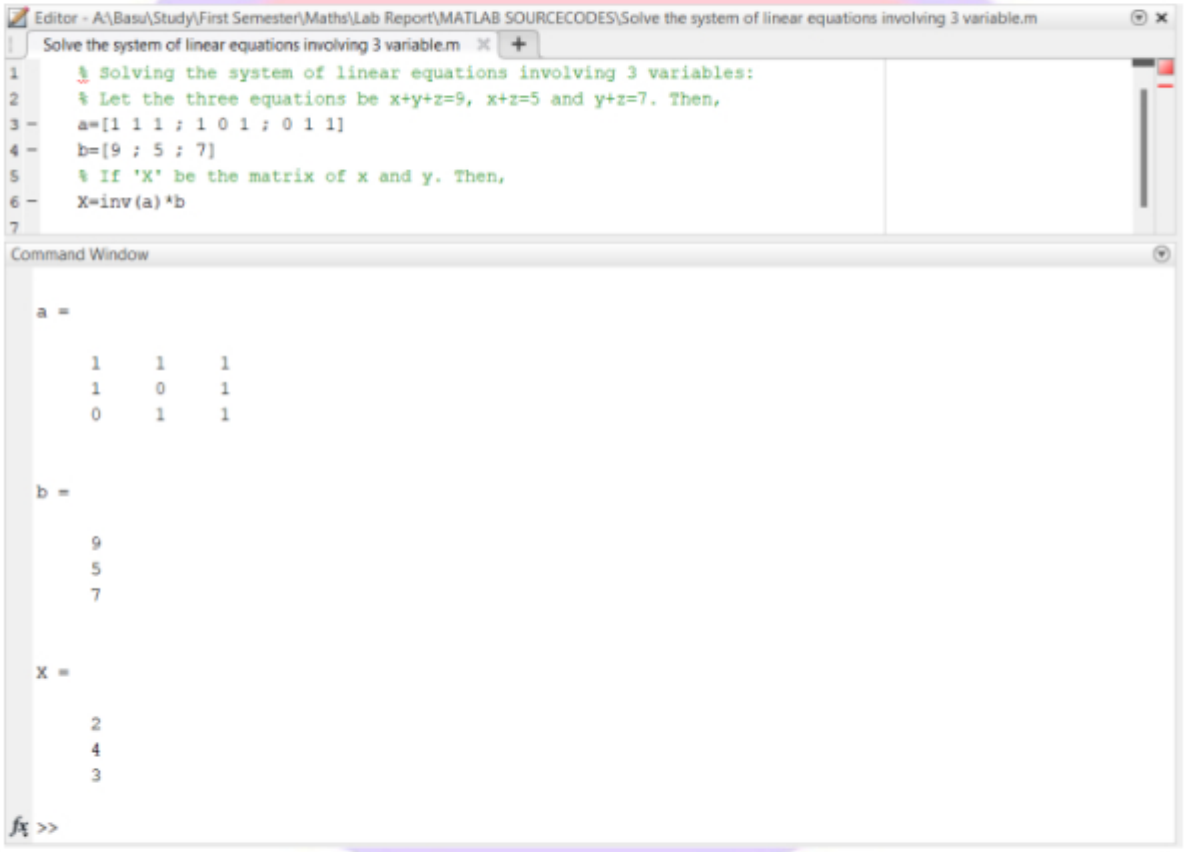
```
1    % Solving the system of linear equations involving 2 variables:
2    % Let the two equations be 6x-4y=0 and x-y=-2. Then,
3 -  a=[6 -4 ; 1 -1]
4 -  b=[0 ; -2]
5    % If 'X' be the matrix of x and y. Then,
6 -  X=inv(a)*b
7
```

Command Window

```
a =

     6    -4
     1    -1


b =

     0
    -2


X =

    4.0000
    6.0000

fx >>
```

4.16: Solve the system of Linear equations involving 3 variables.

Ans:



4.17: Demonstrate one of the properties of determinant.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\property of Determinant.m

property of Determinant.m

```
1     % One property of Determinant:
2     % i.e, "Transposing of a matrix doesn't change the value of Determinant."
3     % Let 'a' be the 3x3 matrix,
4 -   a=magic(3)
5 -   D1=det(a)
6     % Here, D1 is the Determinant of 'a' before transpose.
7 -   D2=det(a')
8     % Here, D2 is the Determinant of 'a' after transpose.
```

Command Window

```
a =

     8     1     6
     3     5     7
     4     9     2


D1 =

  -360


D2 =

  -360

fx >>
```

4.18: Find the Scalar (dot) product of two vectors.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Dot product.m

Dot product.m

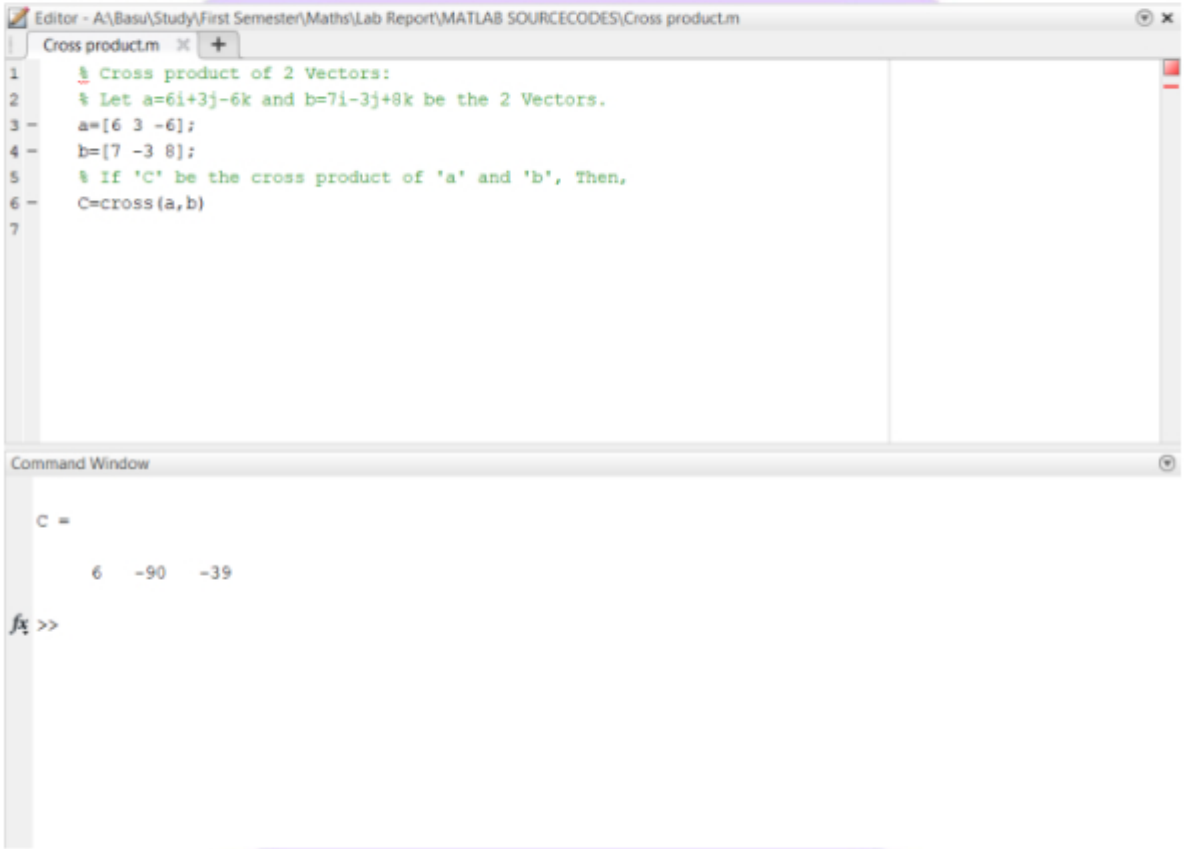
```
1     % Dot product of 2 Vectors:
2     % Let a=5i+2j-3k and b=3i-j+5k be the 2 Vectors.
3 -   a=[5 2 -3];
4 -   b=[3 -1 5];
5     % If 'D' be the dot product of 'a' and 'b', Then,
6 -   D=dot(a,b)
7
```

Command Window

```
D =

    -2

fx >>
```

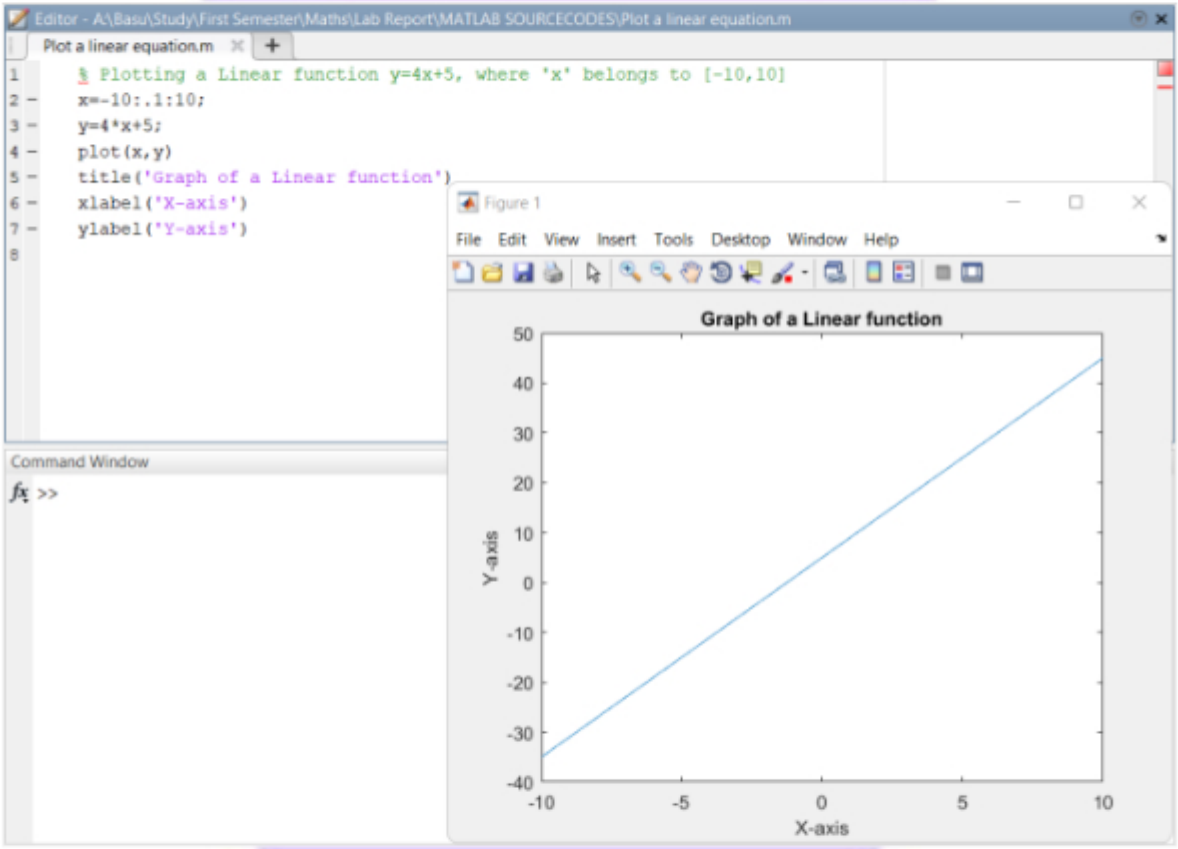
4.19: Find the Vector (cross) product of two vectors.

Ans:



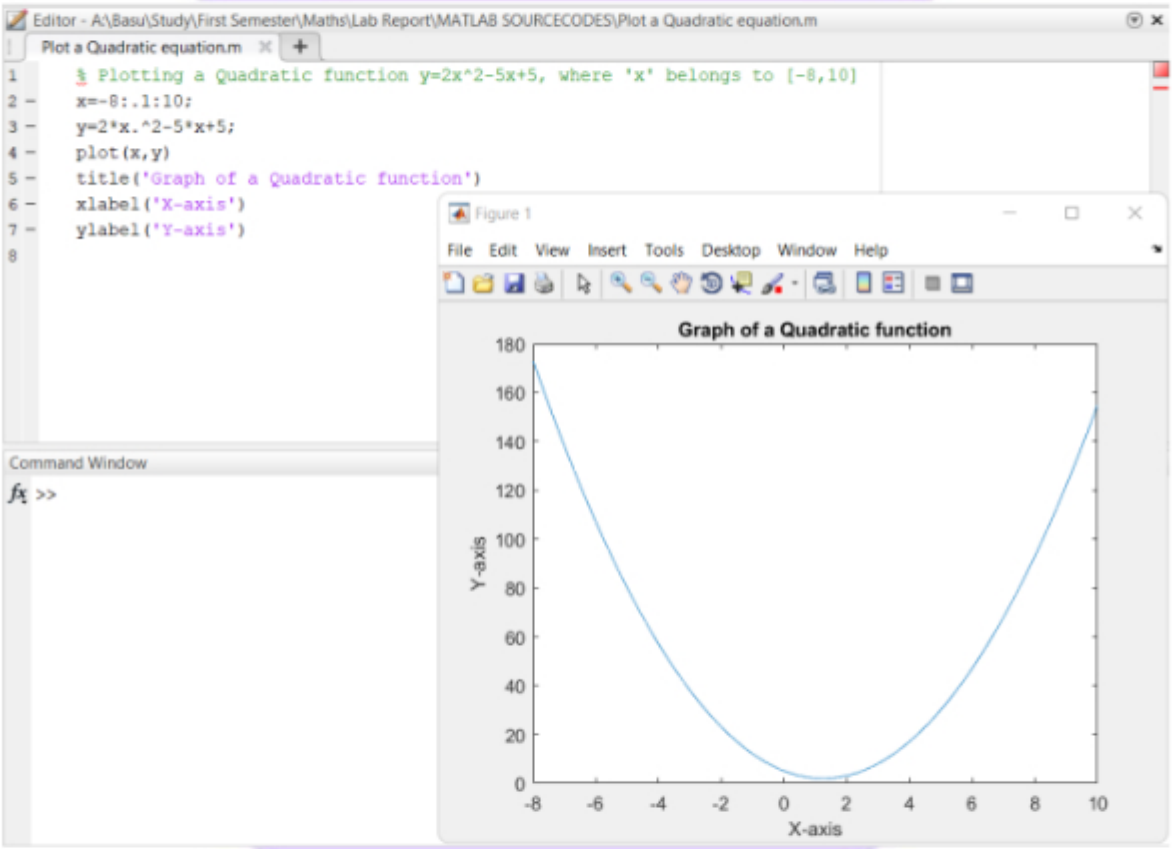
4.20: Plot a Linear function.

Ans:



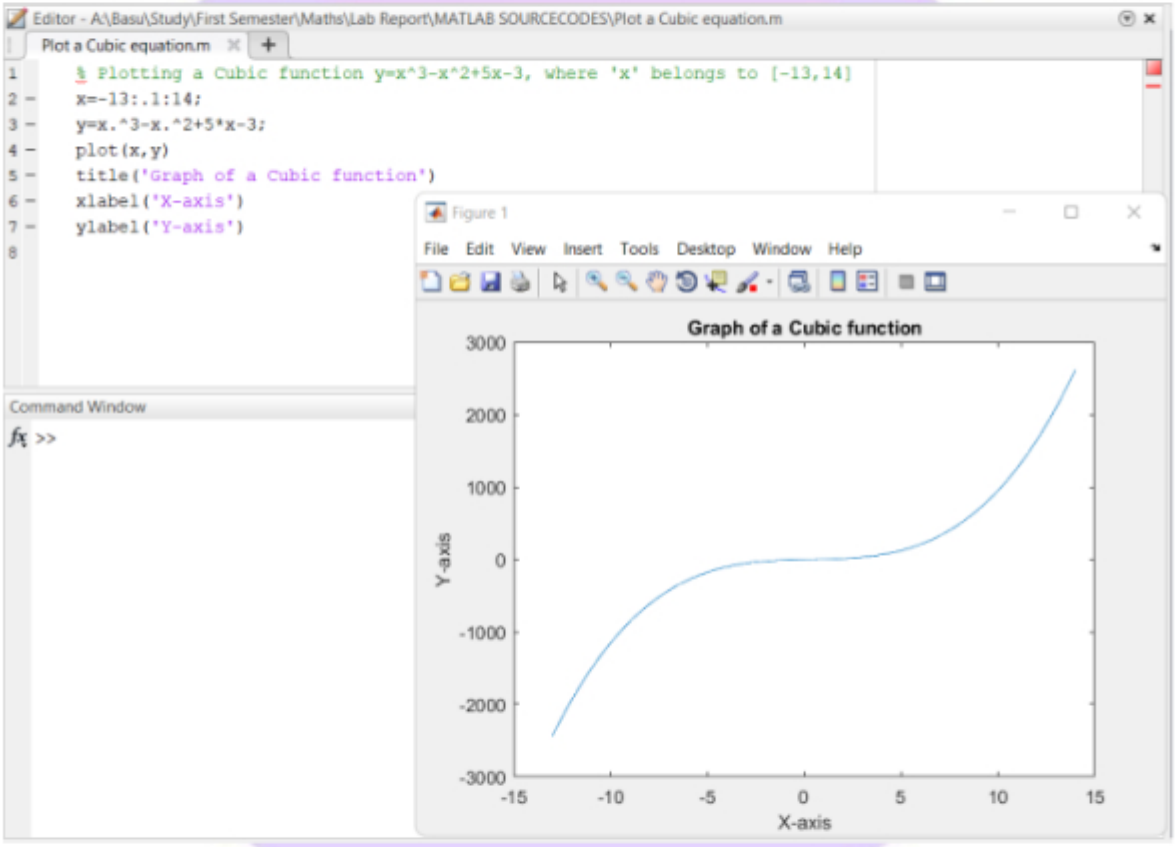
4.21: Plot a Quadratic function.

Ans:



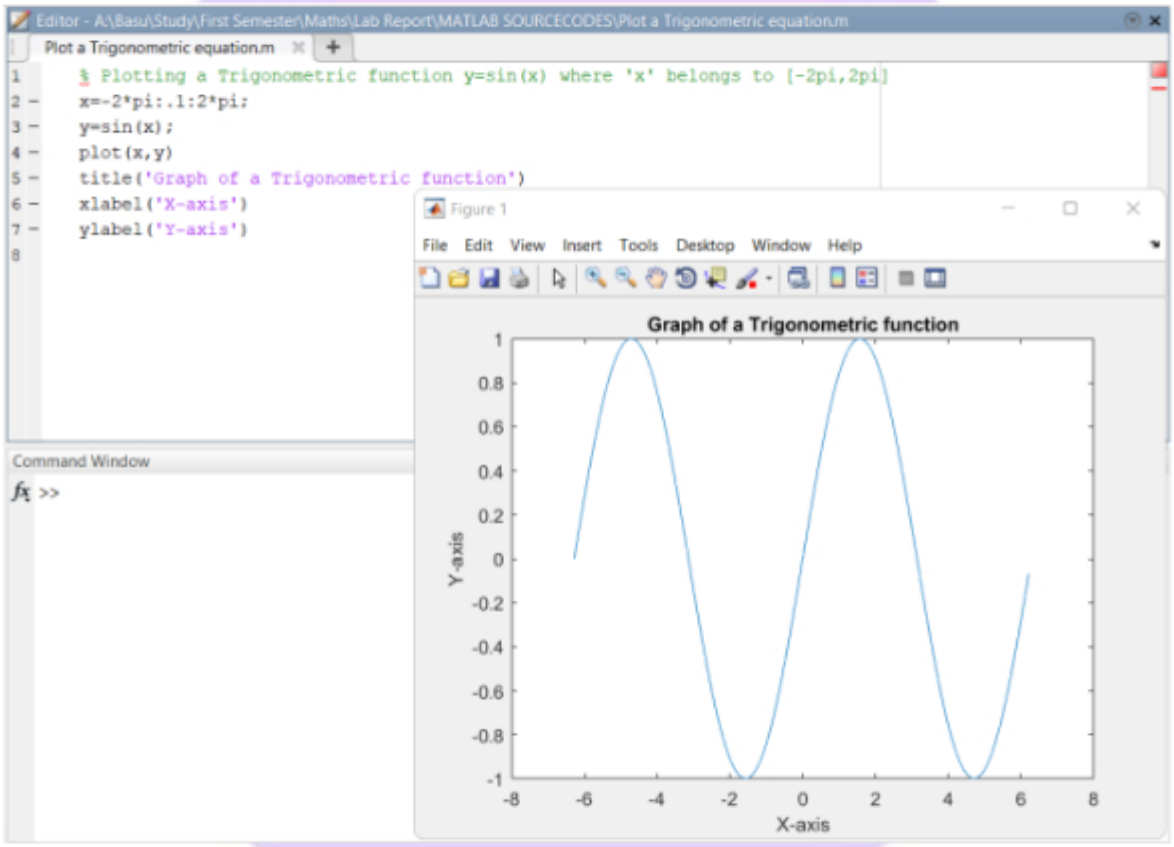
4.22: Plot a Cubic function.

Ans:



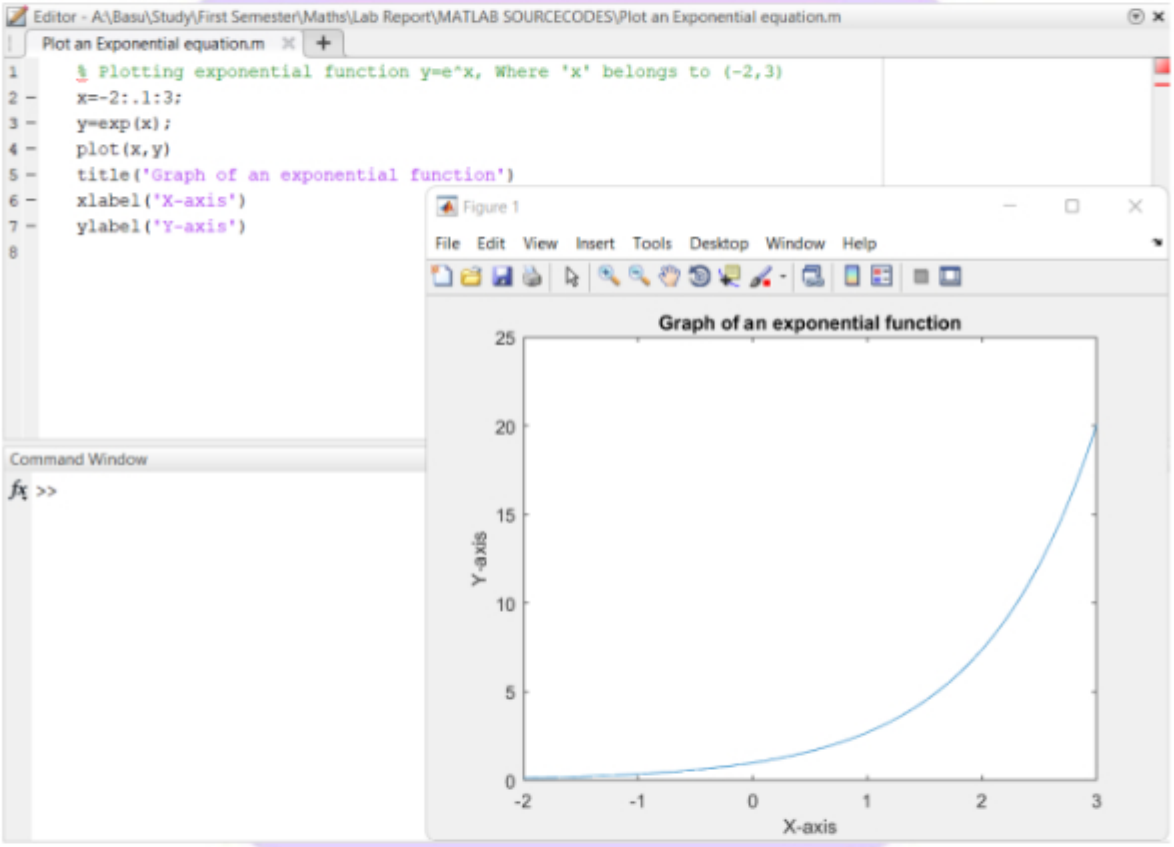
4.23: Plot a Trigonometric function.

Ans:



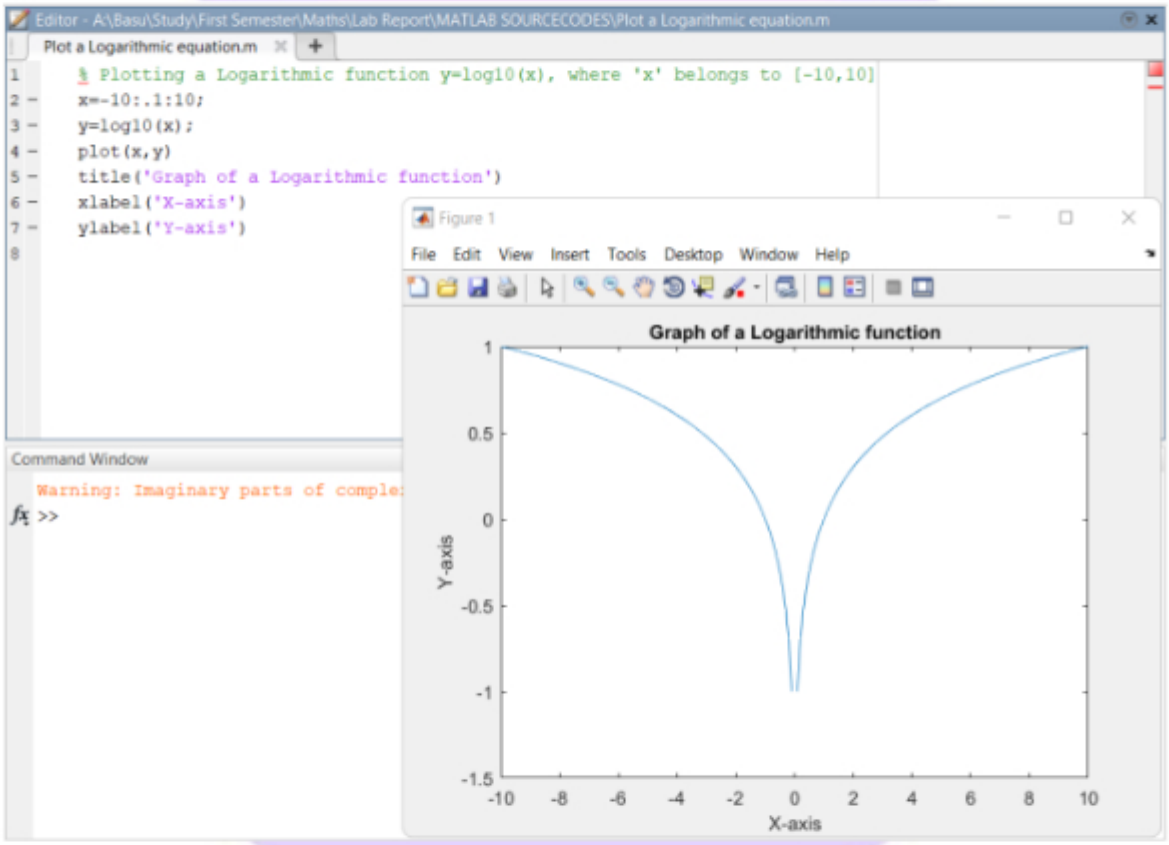
4.24: Plot an Exponential function.

Ans:



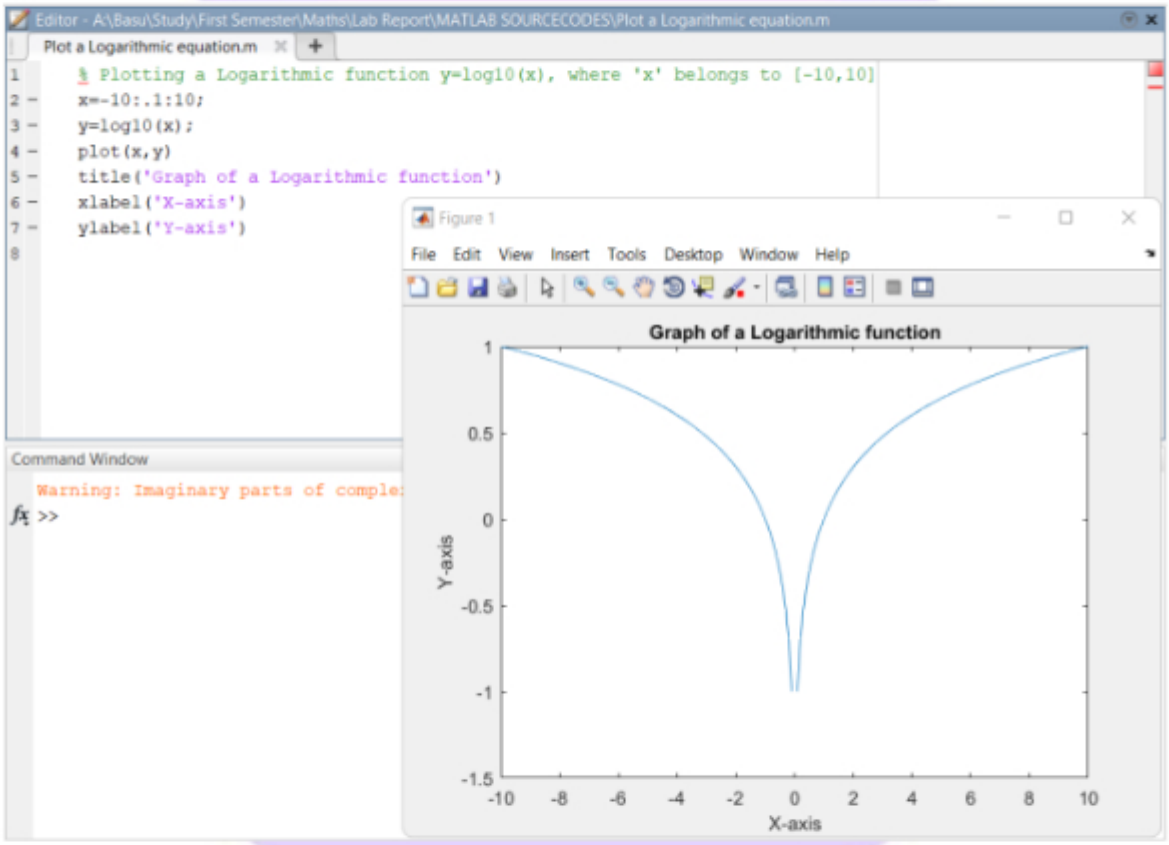
4.25: Plot a Logarithmic function.

Ans:



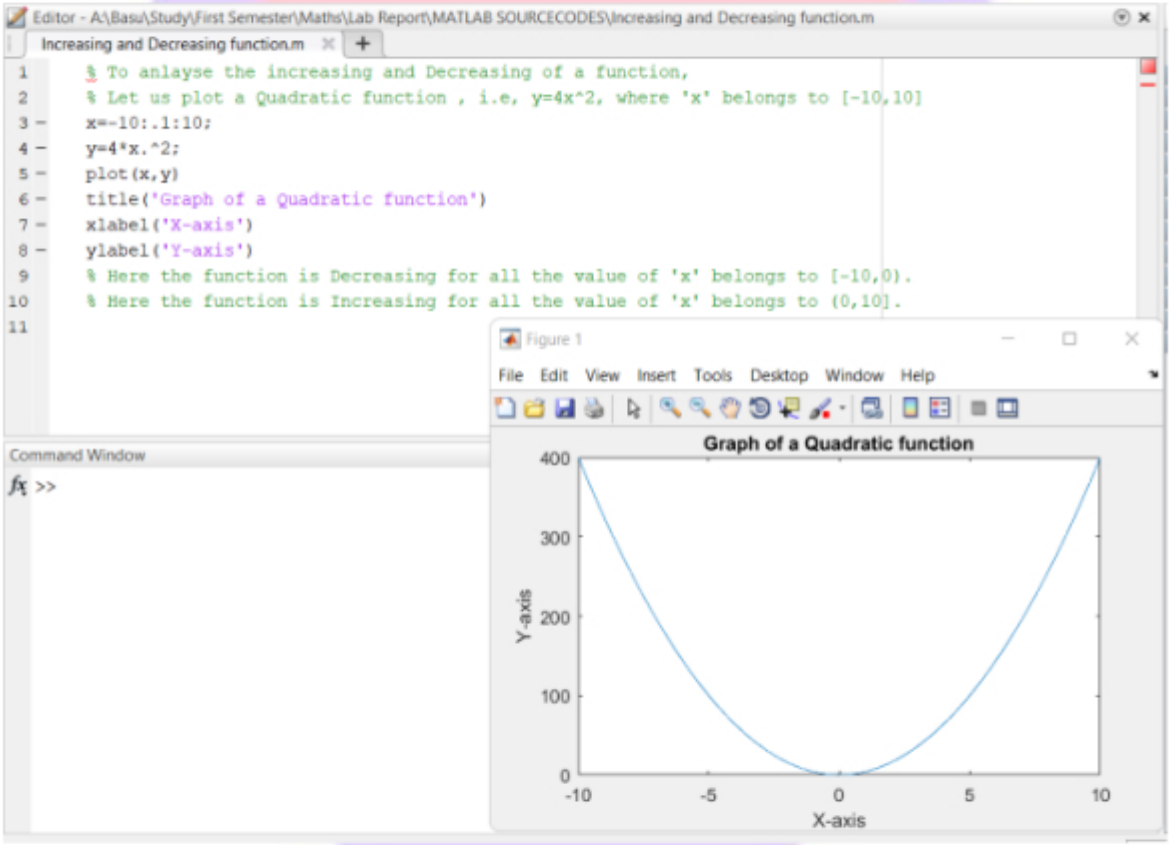
4.25: Plot a Logarithmic function.

Ans:



4.26: Give the sense of Increasing and Decreasing function in certain region.

Ans:



4.27: Give the sense of Concavity of the function in certain region.

Ans:

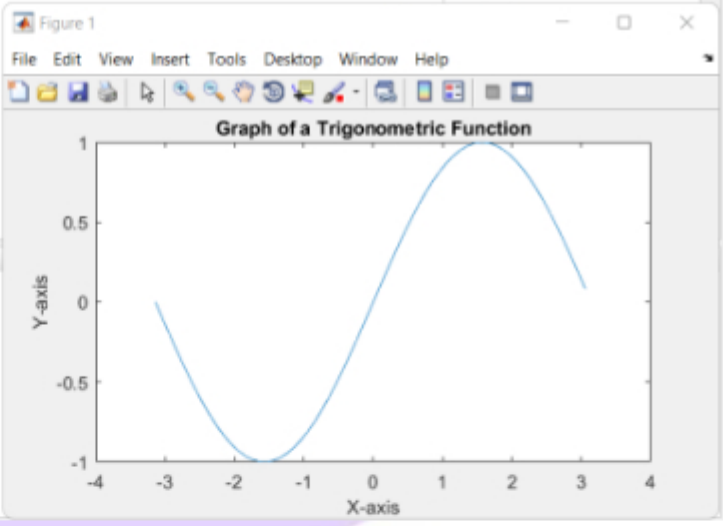
Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Concavity of the function.m

Concavity of the function.m

```
% To anlayse the Concavity of a function:
% Let us plot a Trigonometric function , i.e, y=sin(x), where 'x' belongs to [-pi,pi]
x=-pi:.1:pi;
y=sin(x);
plot(x,y)
title('Graph of a Trigonometric Function')
xlabel('X-axis')
ylabel('Y-axis')
% Here the function is Concave Upward for all the value of 'x' belongs to [-pi,0).
% Here the function is Concave Downward for all the value of 'x' belongs to (0,pi].
```

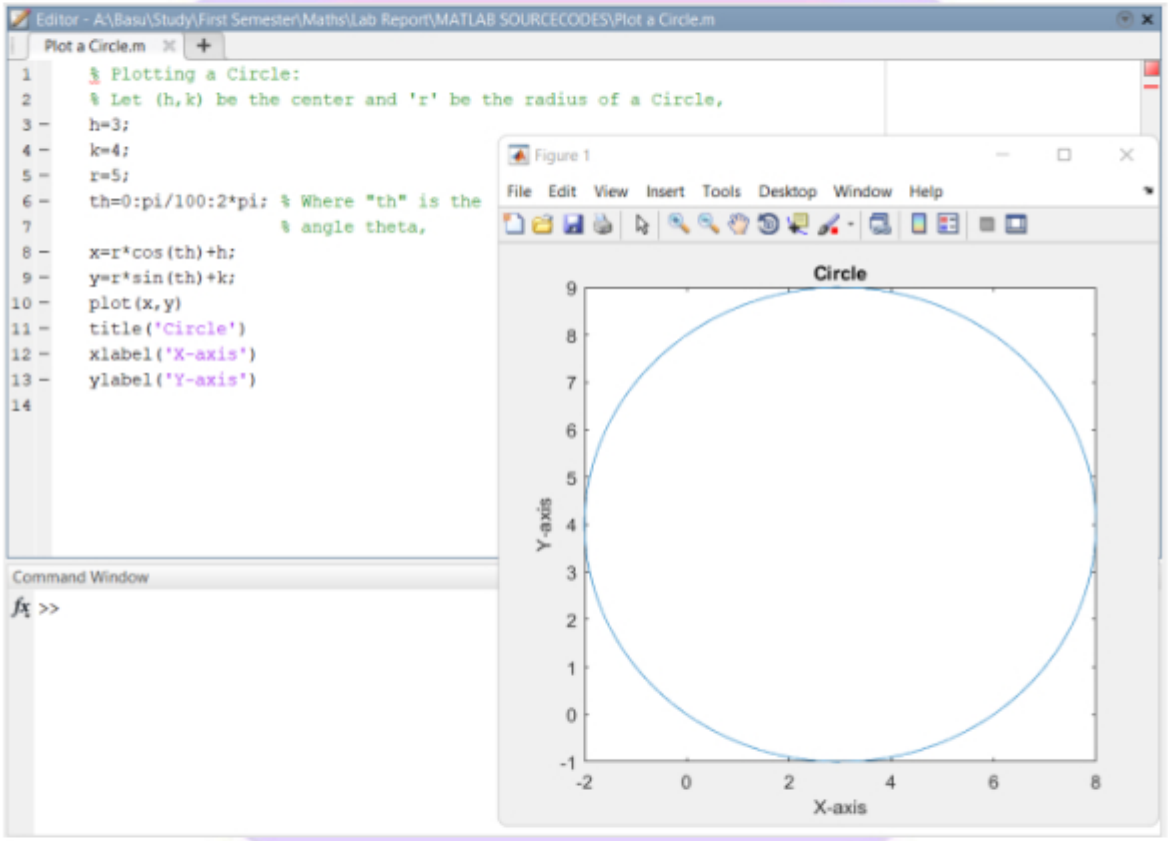
Command Window

```
>>
```



4.28: Plot a Circle.

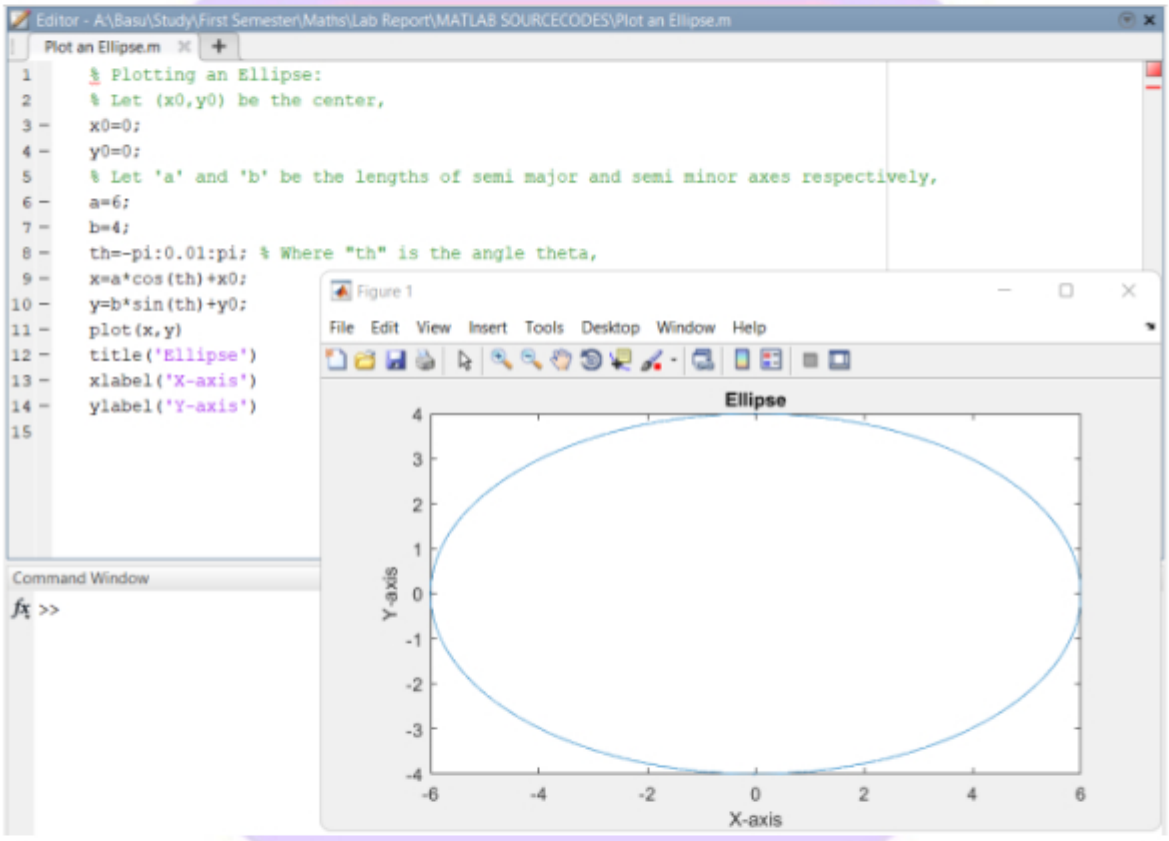
Ans:



4.29: Plot an Ellipse.

Ans:

```
% Plotting an Ellipse:
% Let (x0,y0) be the center,
x0=0;
y0=0;
% Let 'a' and 'b' be the lengths of semi major and semi minor axes respectively,
a=6;
b=4;
th=-pi:0.01:pi; % Where "th" is the angle theta,
x=a*cos(th)+x0;
y=b*sin(th)+y0;
plot(x,y)
title('Ellipse')
xlabel('X-axis')
ylabel('Y-axis')
```



4.30: Find the Scalar triple product of three vectors.

Ans:

Editor - C:\Users\Arjun Lamichhane\Documents\MATLAB\Scalar Triple Product.m

Scalar Triple Product.m

```
% Finding the Scalar Triple Product of 3 Vectors:
% If a= 2i-4j+6k, b= 7i+12j and c= 14i-j+2k be the 3 vectors , Then,
a=[2 -4 6];
b=[7 12 0];
c=[14 -1 2];
% If 's' be the Scalar Triple Product, Then,
s=dot(a,cross(b,c))
```

Command Window

```
s =

  -946

fx >>
```

4.31: Find the Vector triple product of three vectors.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Vector Triple Product.m

Vector Triple Product.m

```
% Finding the Vector Triple Product of 3 Vectors:
% If a= 7i-8j+3k, b= 7j+6k and c= 4i-j be the 3 vectors , Then,
a=[7 -8 3];
b=[0 7 6];
c=[4 -1 0];
% If 'v' be the Vector Triple Product, Then,
v=cross(a,cross(b,c))
```

Command Window

```
v =

   152   214   216

fx >>
```

4.32: Solve a Quadratic Equation.

Ans:

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Solving a Quadratic Equation.m

Solving a Quadratic Equation.m

```
% Solving a Quadratic Equation:
% Let a Quadratic Equation be x^2+3x-10=0 , Then,
syms x
eqn=[x^2+3*x-10==0]
solve(eqn,x)
```

Command Window

```
eqn =

x^2 + 3*x - 10 == 0


ans =

 -5
  2

fx >>
```