



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

Tribhuvan University

Kirtipur, Nepal

N e p a l

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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.

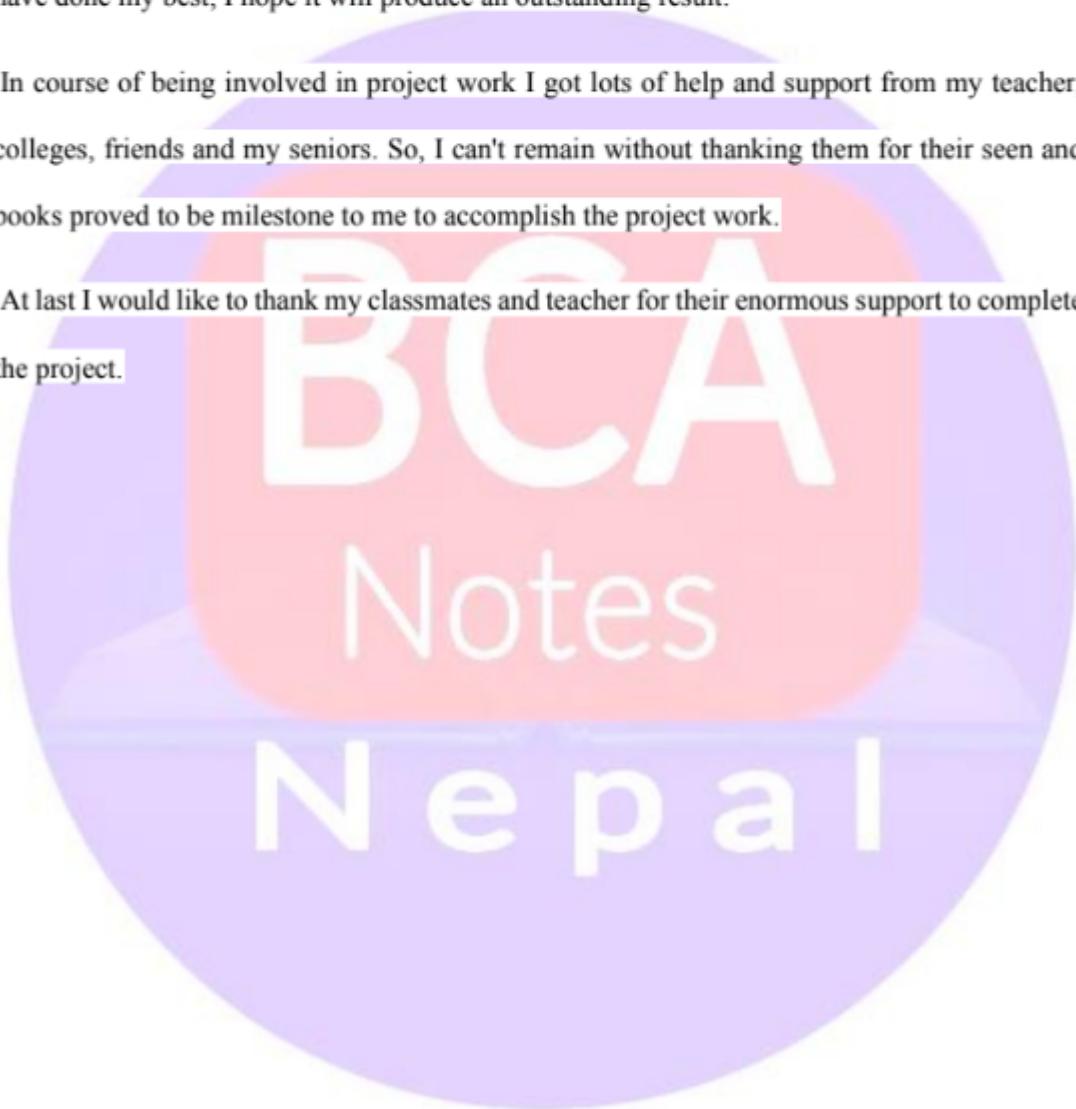


Acknowledgement

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.



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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.

Nepal

4-LAB REPORT

4.1: Construct a Row Matrix.

Ans:

The screenshot shows the MATLAB environment with two windows: the Editor and the Command Window.

Editor Window: The file name is "Row matrix.m". The code contains the following lines:

```
1 % Construction of a 1x6 Row Matrix 'A',
2 A=[2 4 5 7 8 9]
3
4
```

Command Window: The output shows the matrix A defined as:

```
A =
    2     4     5     7     8     9
```

4.2: Construct a Column Matrix.

Ans:

The screenshot shows the MATLAB environment with two windows. The top window is the 'Editor' showing a script named 'Column Matrix.m'. The code inside the editor is:

```
Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Column Matrix.m
Column Matrix.m  X  +
1 % Construction of a 6x1 Column Matrix 'A',
2 - A=[4;5;3;8;10;12]
```

The bottom window is the 'Command Window' displaying the output of the script. The output shows the variable 'A' defined as a column vector:

```
Command Window
A =
4
5
3
8
10
12
fxt >>
```

4.3: Construct an Identity Matrix.

Ans:

The screenshot shows the MATLAB environment with two windows: the Editor and the Command Window.

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

```
1 %Construct an 5X5 Identity Matrix 'A'.
2 - A=eye(5,5)
```

Command Window

```
A =
1 0 0 0 0
0 1 0 0 0
0 0 1 0 0
0 0 0 1 0
0 0 0 0 1
fxt >>
```

4.4: Construct a Null Matrix.

Ans:

The screenshot shows the MATLAB environment. The Editor window at the top contains the following code:

```
1 % Construct a 6x6 Null Matrix 'A'.
2 A=zeros(6,6)
3
```

The Command Window below displays the output of the code:

```
A =
0 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 0
```

4.5: Construct a Square Matrix.

Ans:

The screenshot shows the MATLAB environment with two windows: the Editor and the Command Window.

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

```
1 % construct an 5X5 Square Matrix 'S'.
2 S=[2 5 6 3 5 ; 3 4 6 2 5 ; 5 10 11 12 3 ; 4 5 2 22 4 ; 4 7 21 44 66]
3
```

Command Window

```
S =
```

2	5	6	3	5
3	4	6	2	5
5	10	11	12	3
4	5	2	22	4
4	7	21	44	66

```
fxt >>
```

4.6: Construct a Rectangular Matrix.

Ans:

The screenshot shows the MATLAB environment with two windows: the Editor and the Command Window.

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

```
1 %Construct a 3X5 Rectangular Matrix 'R'.
2 R=[3 5 8 4 6 ; 9 10 23 45 6 ;5 13 20 19 28]
3
```

Command Window

```
R =
    3     5     8     4     6
    9    10    23    45     6
    5    13    20    19    28
```

f1 >>

4.7: Find the sum of two matrices.

Ans:

The screenshot shows the MATLAB environment with the following details:

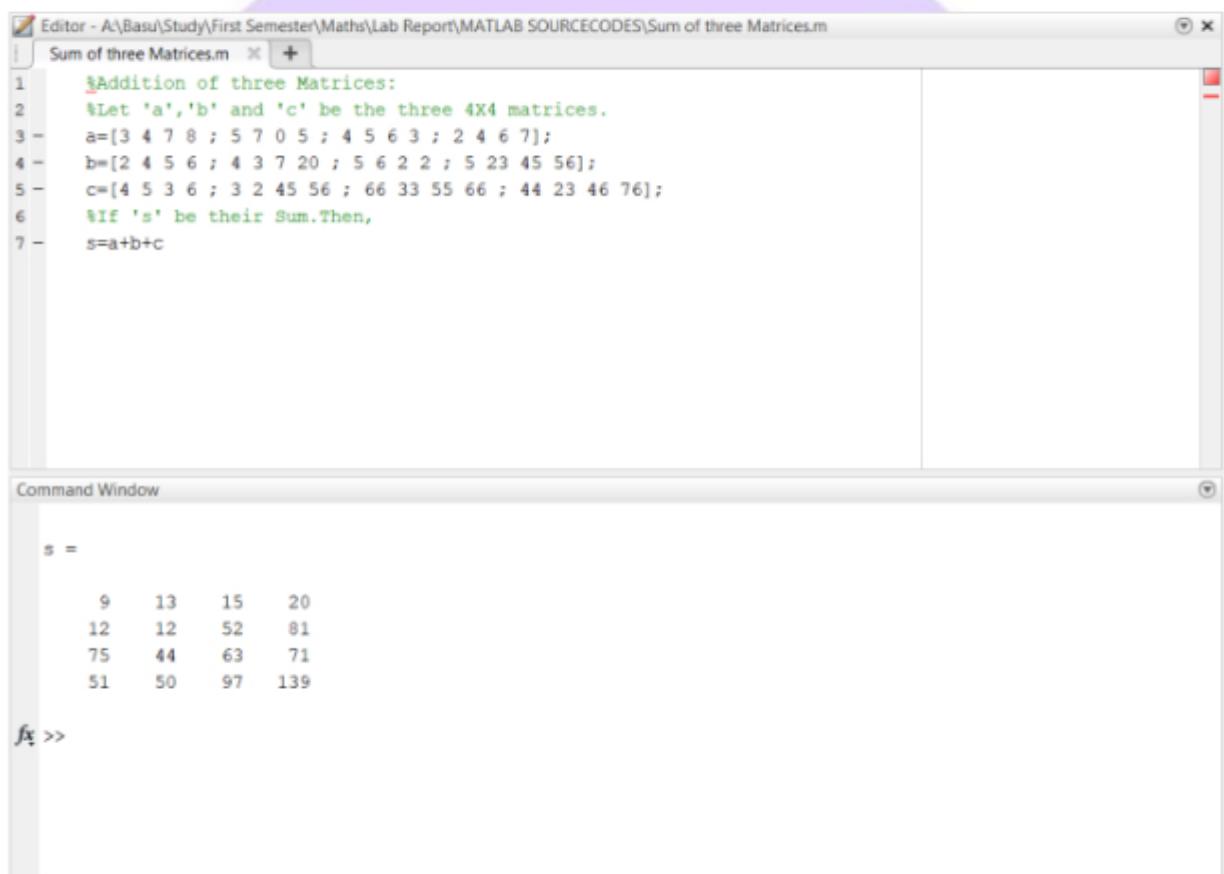
- Editor:** A window titled "Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Sum of two Matrices.m". It contains the following MATLAB code:

```
1 % Addition of two Matrices;
2 %Let 'a' and 'b' be the two 3X3 matrices.
3 a=[2 4 6 ; 7 8 9 ; 10 11 12];
4 b=[1 3 5 ; 9 0 7 ; 4 5 6 ];
5 %If 's' be their sum.Then,
6 s=a+b
7
```
- Command Window:** A window titled "Command Window" showing the output of the code:

```
s =
    3     7    11
   16     16    16
   14     16    18
f15 >>
```

4.8: Find the sum of three matrices.

Ans:



The image shows a MATLAB workspace with two main windows: the Editor and the Command Window.

Editor: The file name is "Sum of three Matrices.m". The code is as follows:

```
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
```

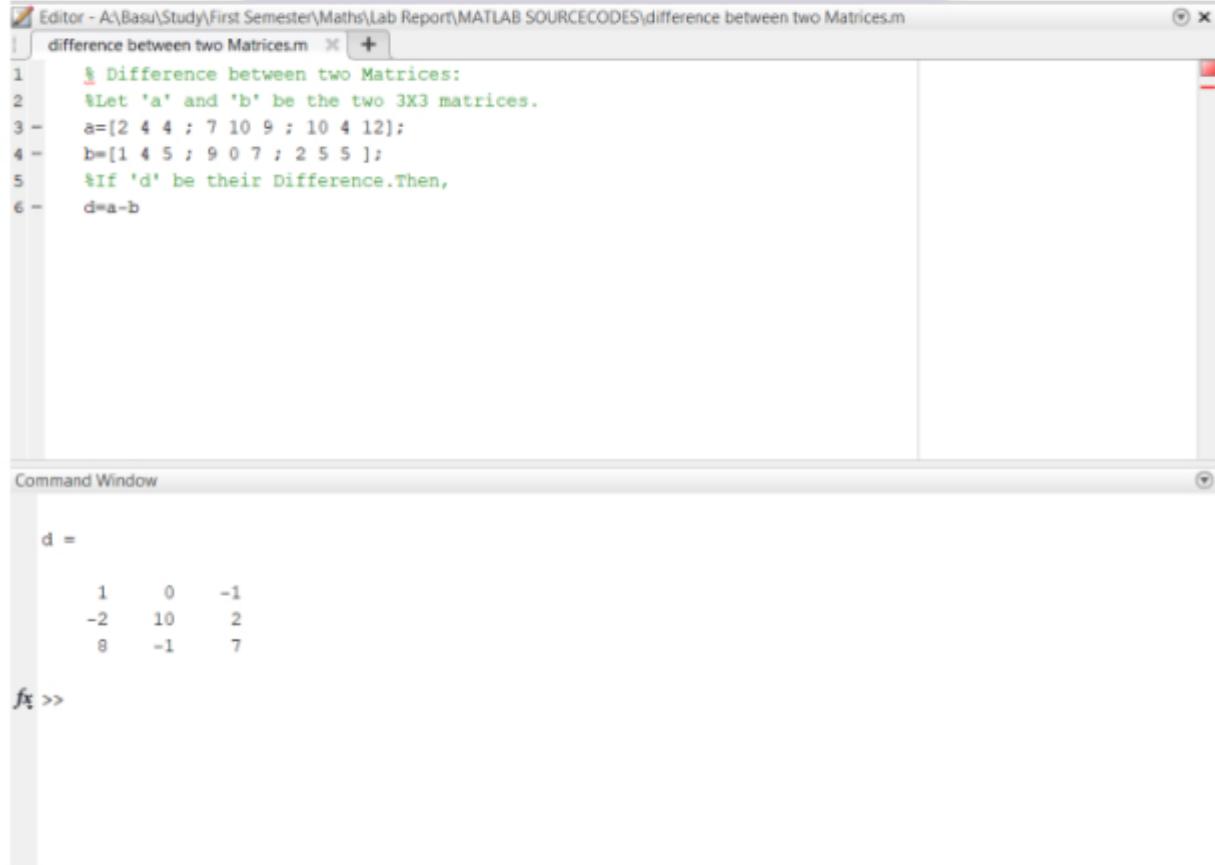
Command Window:

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

At the bottom of the Command Window, there is a small icon followed by ">>".

4.9: Find the difference between two matrices.

Ans:



The image shows a MATLAB interface with two main windows: the Editor and the Command Window.

Editor Window: The title bar reads "Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\difference between two Matrices.m". The code inside the editor is as follows:

```
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
```

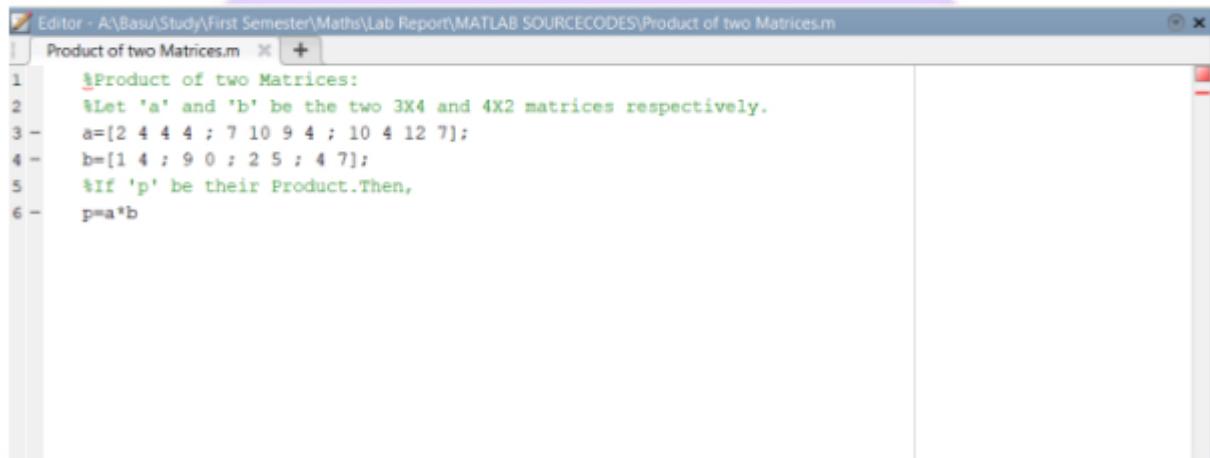
Command Window: The title bar reads "Command Window". The output from the command window is:

```
d =
    1     0    -1
   -2    10     2
    8    -1     7
```

At the bottom of the command window, there is a small icon followed by the text "fxt >>".

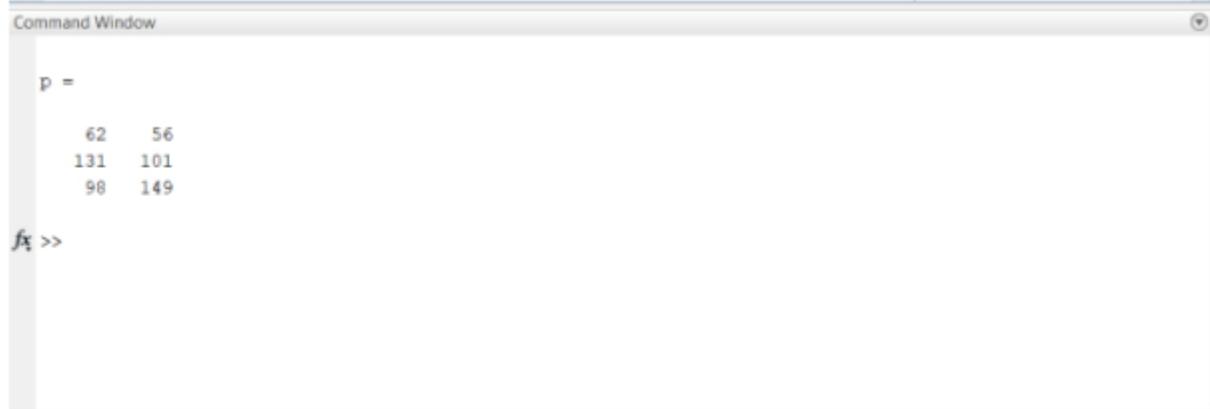
4.10: Introduce the Product of two matrices.

Ans:



The screenshot shows the MATLAB Editor window with a script file named 'Product of two Matrices.m'. The code in the editor is as follows:

```
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
```



The screenshot shows the MATLAB Command Window displaying the result of the matrix multiplication. The command 'p = a*b' was run, and the resulting matrix 'p' is displayed as:

```
p =  
62 56  
131 101  
98 149
```

The prompt 'f1 >>' is visible at the bottom of the window.

4.11: Find the Determinant of given matrix.

Ans:

The screenshot shows the MATLAB environment with two windows open. The top window is the 'Editor' showing the script file 'Determinant of a Matrix.m'. The bottom window is the 'Command Window' displaying the results of the execution.

```
Determinant 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 'd' the determinant of 'a'. Then,
5 - d=det(a)
```

Command Window

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

d =
326.0000

fx >>
```

4.12: Find the Transpose of given matrix.

Ans:

The image shows a MATLAB development environment. The top part is the MATLAB Editor window titled 'Transpose of a Matrix.m'. It contains the following MATLAB code:

```
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'
```

The bottom part is the MATLAB Command Window, which displays the results of running the script:

```
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:

The screenshot shows a MATLAB environment with two windows. The top window is the 'Editor' showing the code for 'Inverse of a matrix.m'. The bottom window is the 'Command Window' displaying the results of running the script.

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\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  
f1 >>
```

4.14: Find the Adjoint of given matrix.

Ans:

The image shows a MATLAB workspace with two main windows: the Editor and the Command Window.

Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\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

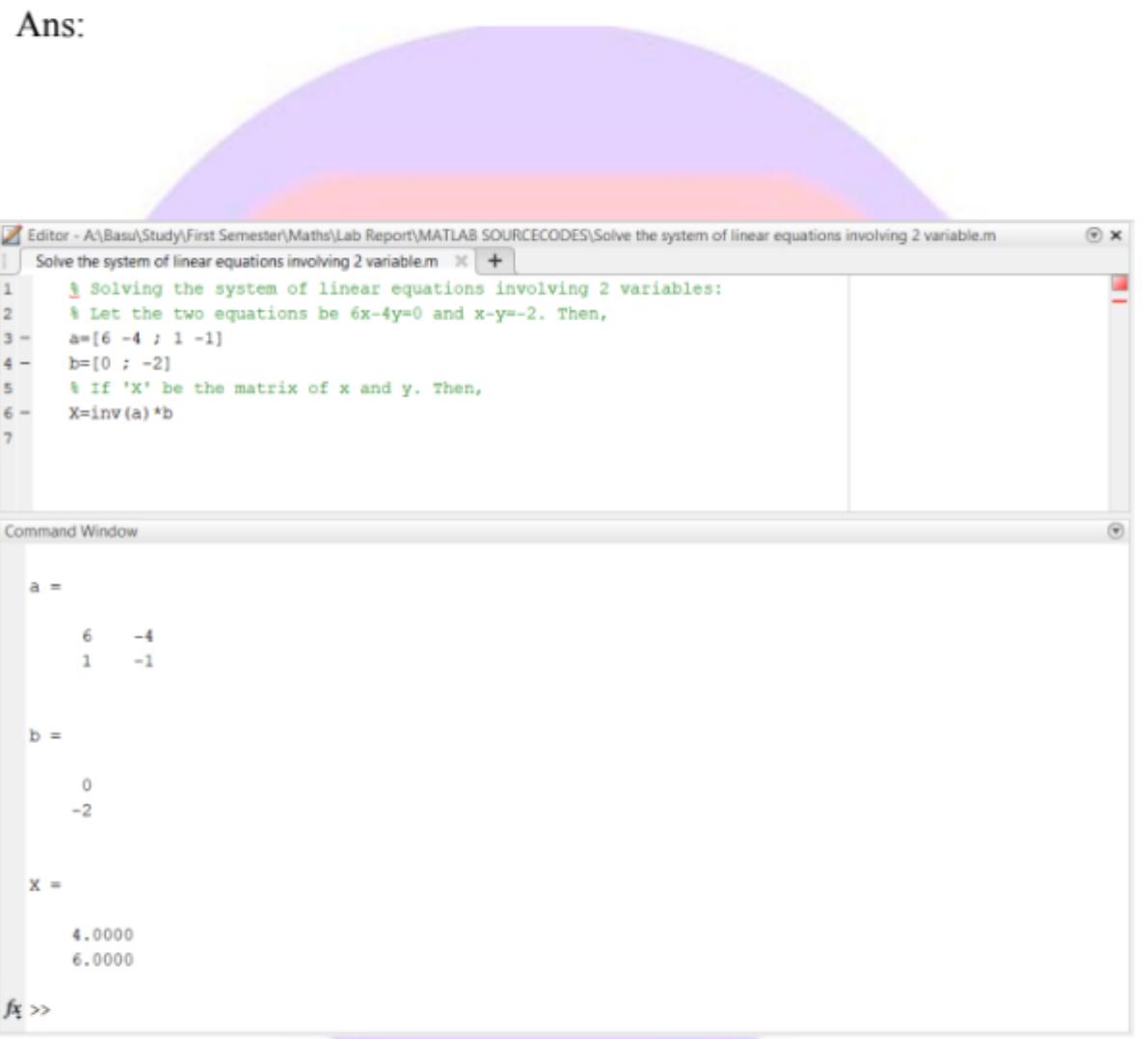
```
a =
8     1     6
3     5     7
4     9     2

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

f1 >>
```

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

```
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:



Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Solve the system of linear equations involving 3 variable.m

```
1 % Solving the system of linear equations involving 3 variables:  
2 % Let the three equations be x+y+z=9, x+z=5 and y+z=7. Then,  
3 - a=[1 1 1 ; 1 0 1 ; 0 1 1]  
4 - b=[9 ; 5 ; 7]  
5 % If 'X' be the matrix of x and y. Then,  
6 - X=inv(a)*b  
7
```

Command Window

```
a =  
  
1 1 1  
1 0 1  
0 1 1  
  
b =  
  
9  
5  
7  
  
X =  
  
2  
4  
3
```

f4 >>

4.17: Demonstrate one of the properties of determinant.

Ans:

The image shows a MATLAB environment with a script editor and a command window. The script editor contains a file named 'property of Determinant.m' with the following code:

```
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.
```

The command window below shows the execution of the script. It first defines a 3x3 magic square matrix 'a'. Then it calculates the determinant 'D1' before transposing and 'D2' after transposing. Both determinants are found to be -360.

```
a =
8     1     6
3     5     7
4     9     2

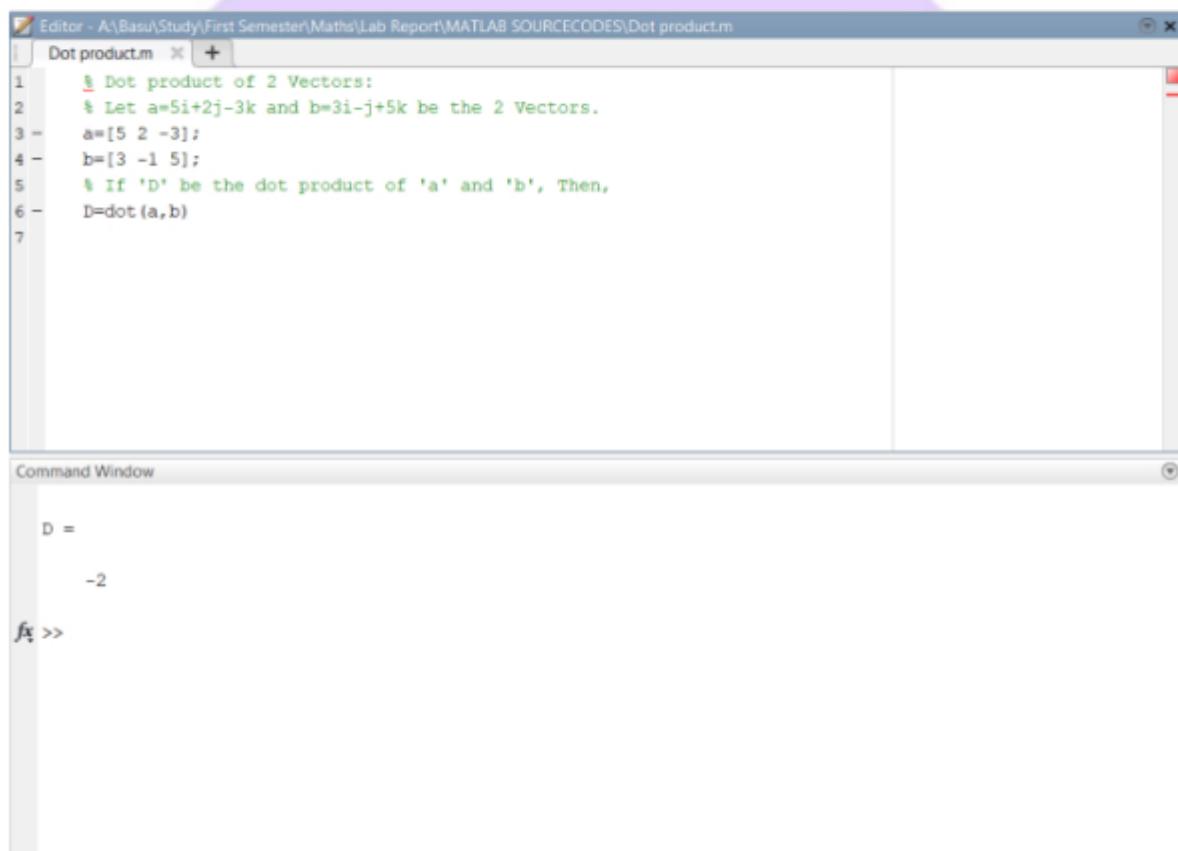
D1 =
-360

D2 =
-360

fxt >>
```

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

Ans:



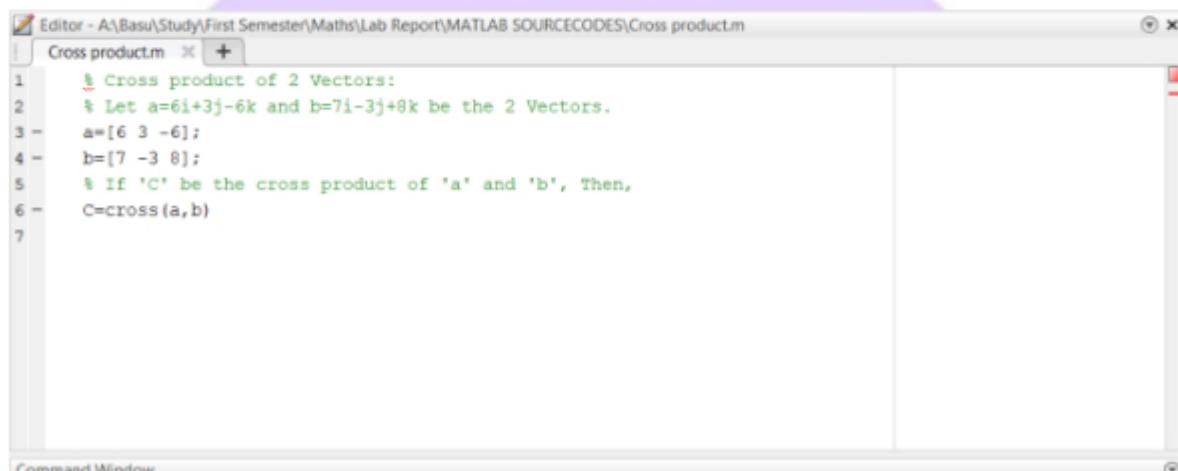
The image shows a MATLAB environment with two windows. The top window is the 'Editor' showing a script named 'Dot product.m'. The code calculates the dot product of two vectors, 'a' and 'b', defined as [5 2 -3] and [3 -1 5] respectively. The result is stored in variable 'D'. The bottom window is the 'Command Window' displaying the output: 'D = -2'.

```
Editor - A:\Basu\Study\First Semester\Maths\Lab Report\MATLAB SOURCECODES\Dot product.m
Dot product.m  X  +
1 % Dot product of 2 Vectors:
2 % Let a=5i+2j-3k and b=3i-j+5k be the 2 Vectors.
3 -
4 a=[5 2 -3];
5 b=[3 -1 5];
6 %
7 D=dot(a,b)
8
```

```
Command Window
D =
-2
fx >>
```

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

Ans:



The screenshot shows the MATLAB environment. The top part is the MATLAB Editor window titled 'Cross product.m'. It contains the following code:

```
1 % Cross product of 2 Vectors:  
2 % Let a=6i+3j-6k and b=7i-3j+8k be the 2 Vectors.  
3 - a=[6 3 -6];  
4 - b=[7 -3 8];  
5 % If 'C' be the cross product of 'a' and 'b', Then,  
6 C=cross(a,b)  
7
```

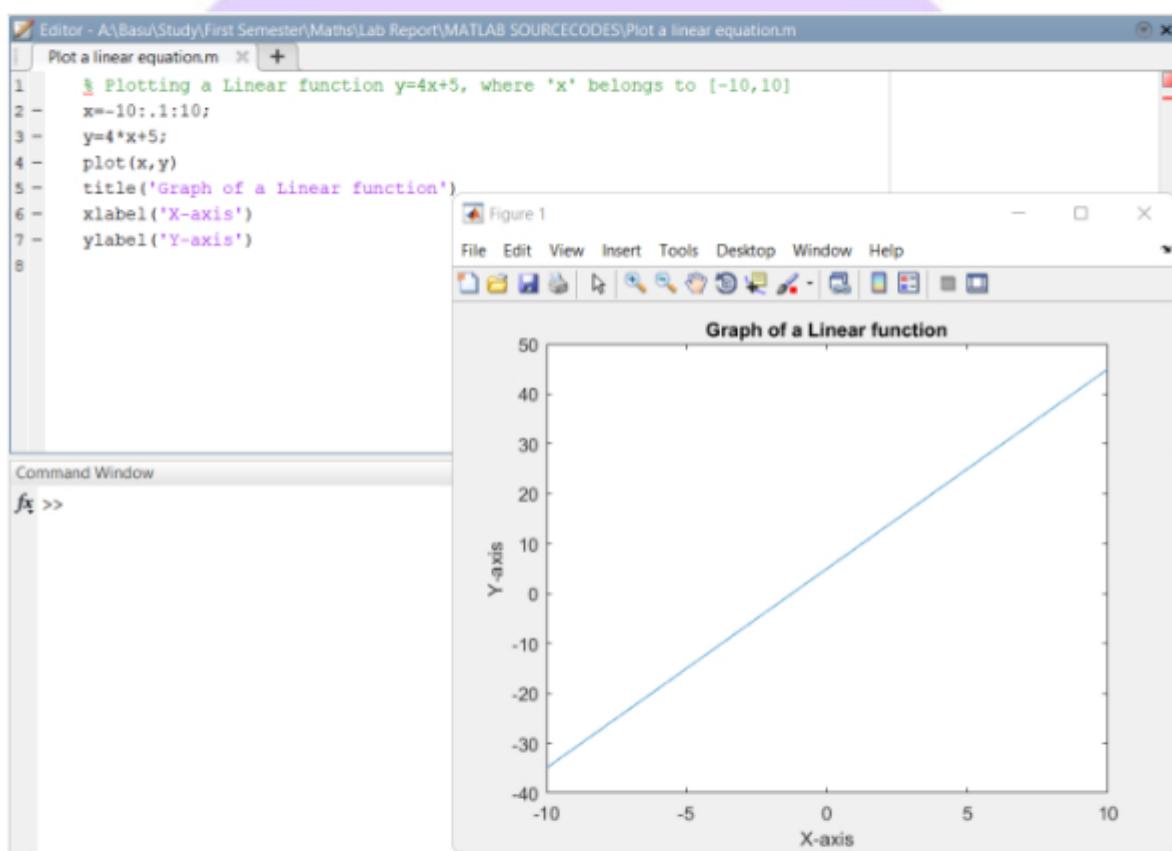
The bottom part is the Command Window, which displays the result of running the script:

```
C =  
       6    -90    -39
```

fxt >>

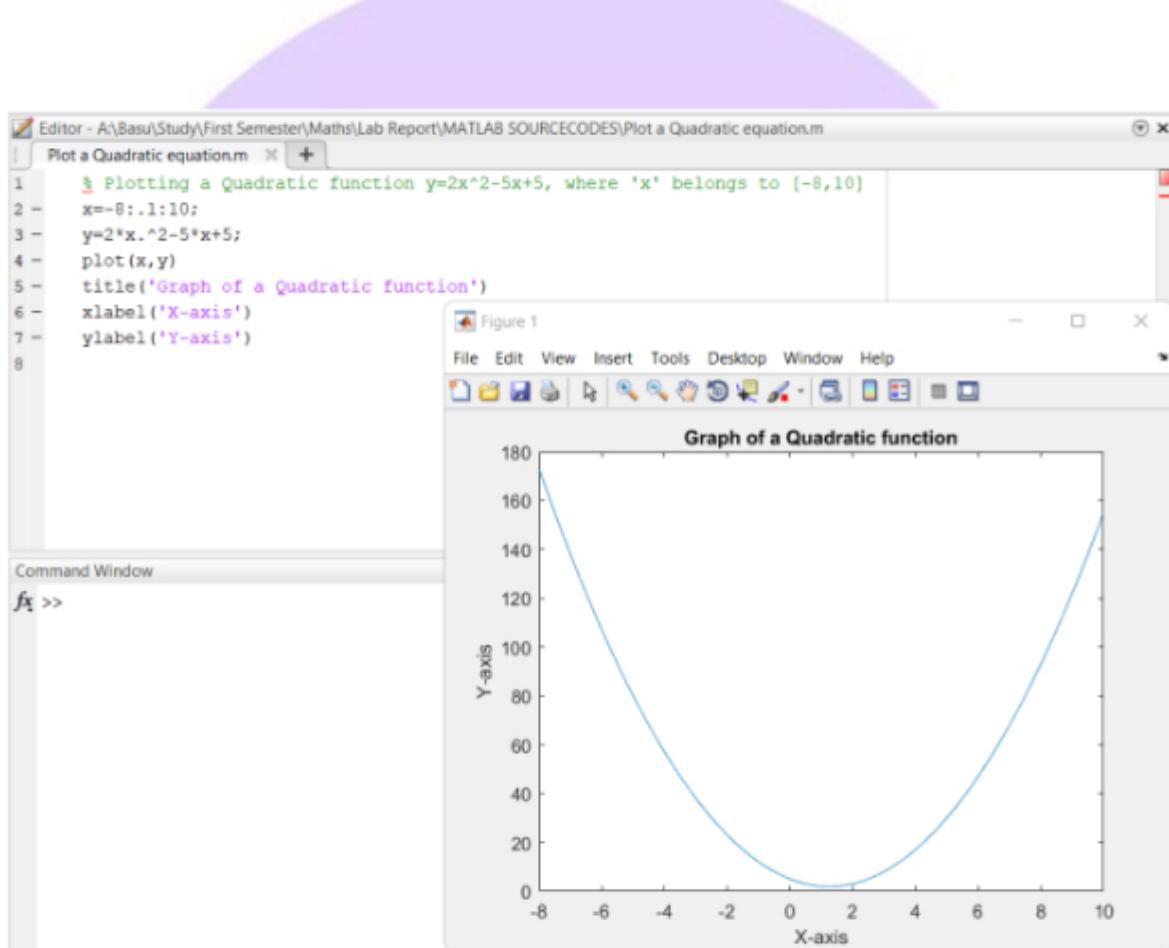
4.20: Plot a Linear function.

Ans:



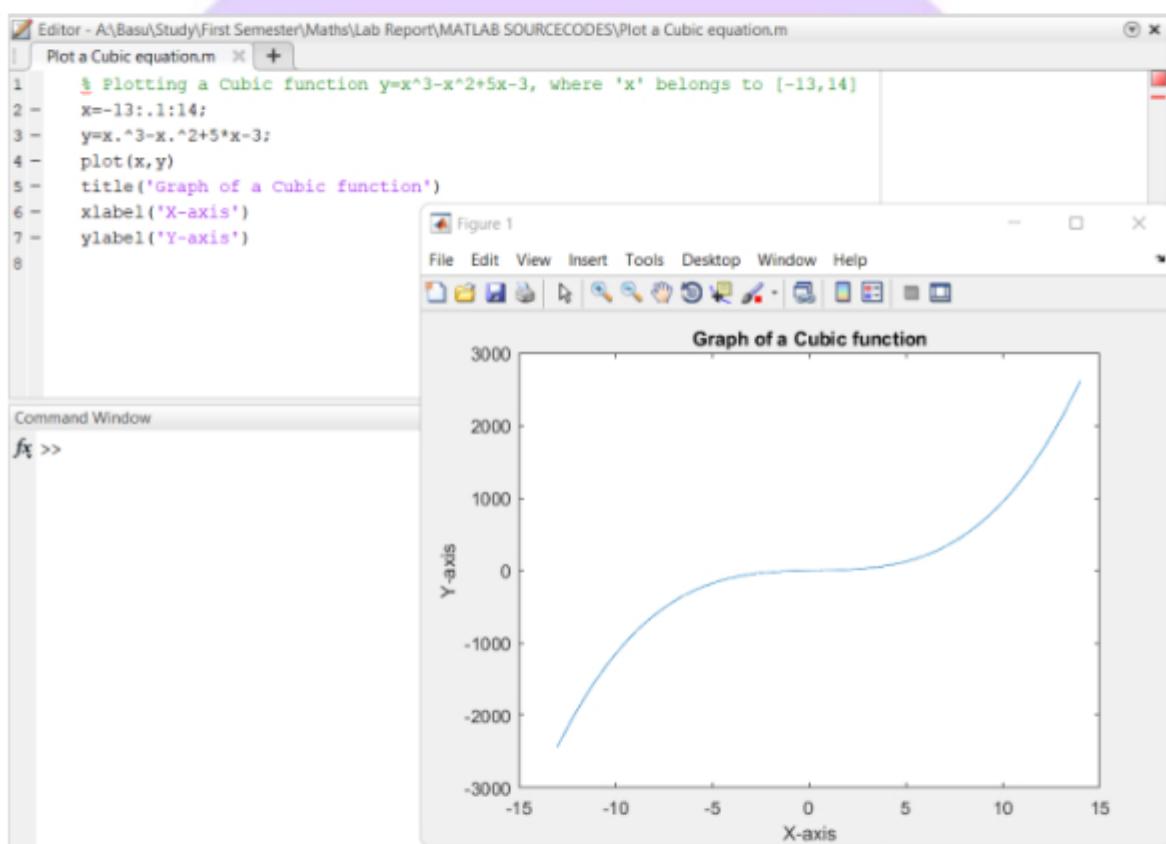
4.21: Plot a Quadratic function.

Ans:



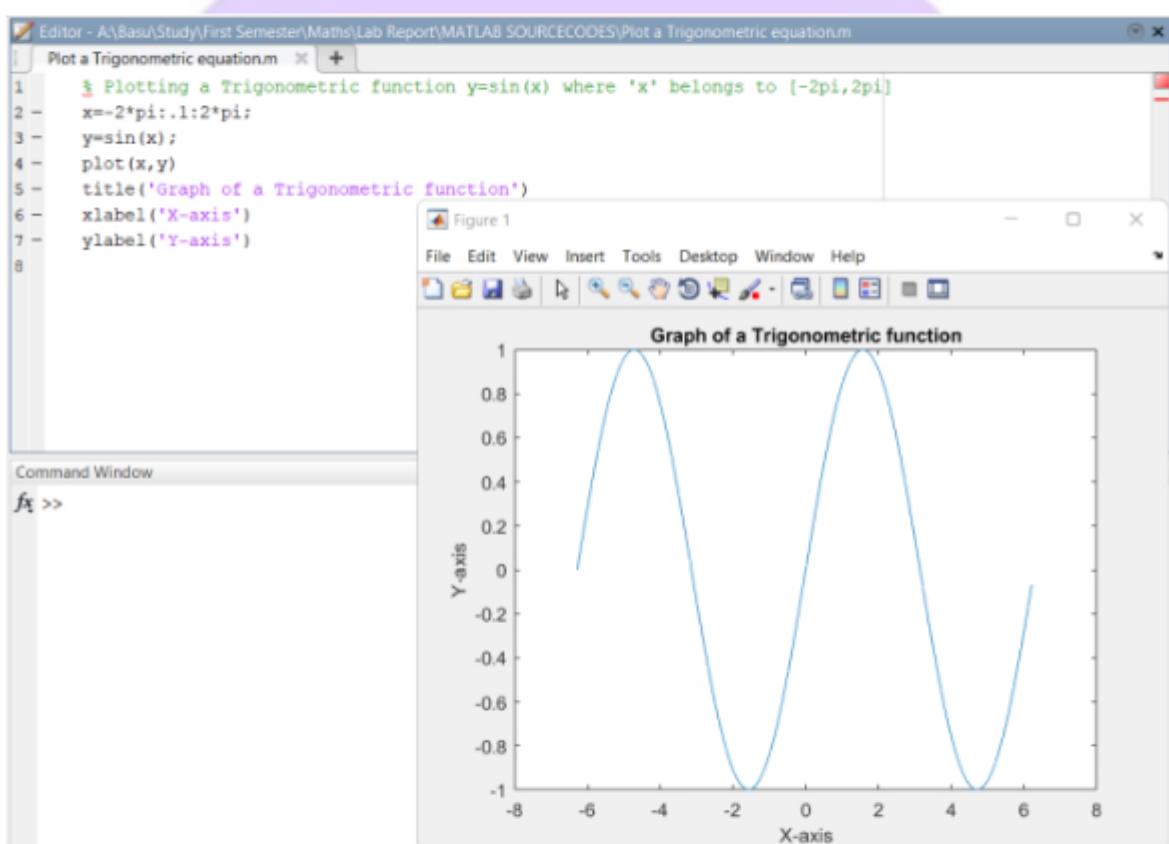
4.22: Plot a Cubic function.

Ans:



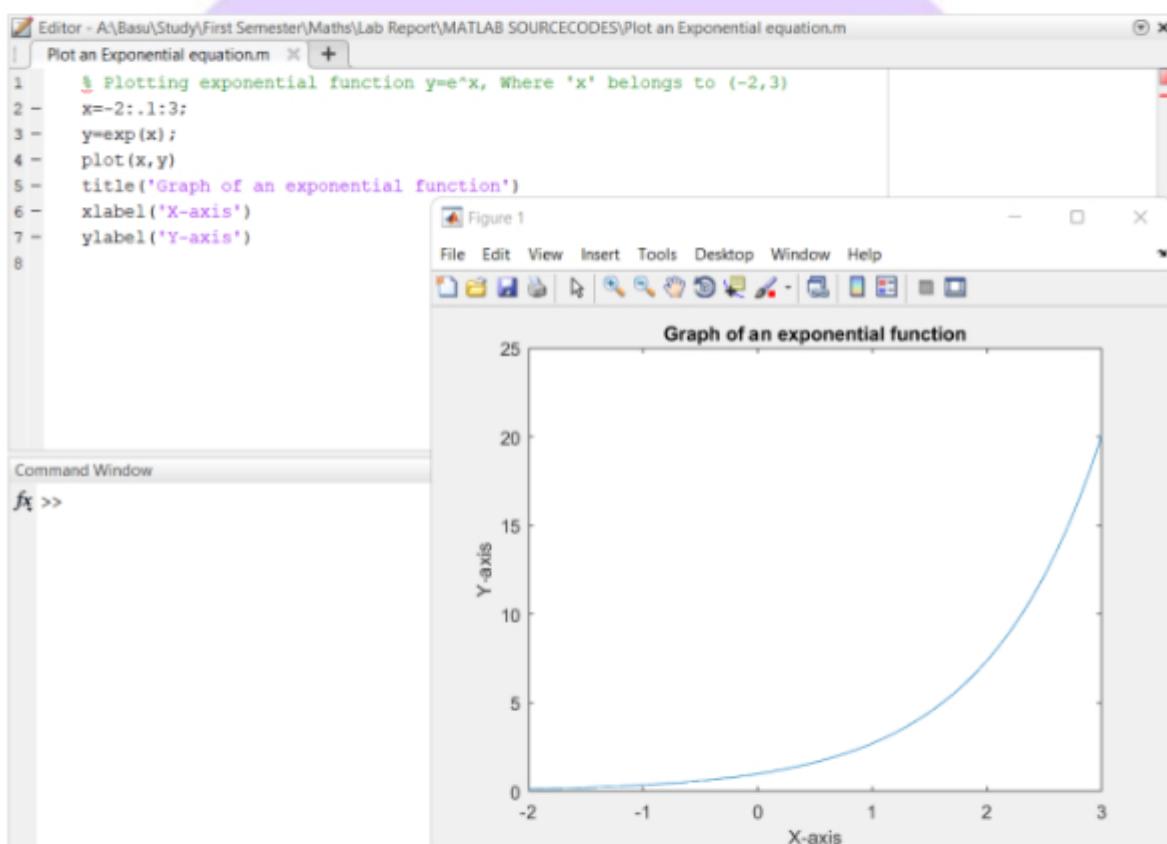
4.23: Plot a Trigonometric function.

Ans:



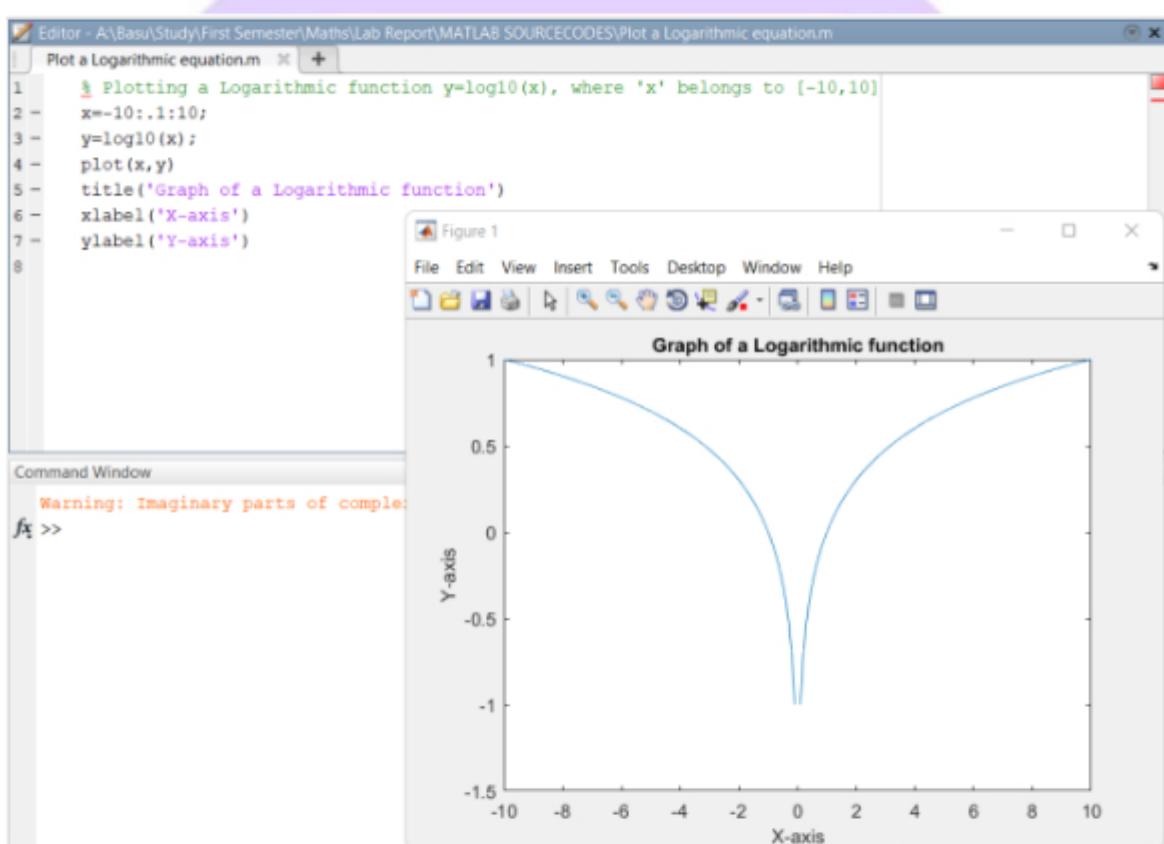
4.24: Plot an Exponential function.

Ans:



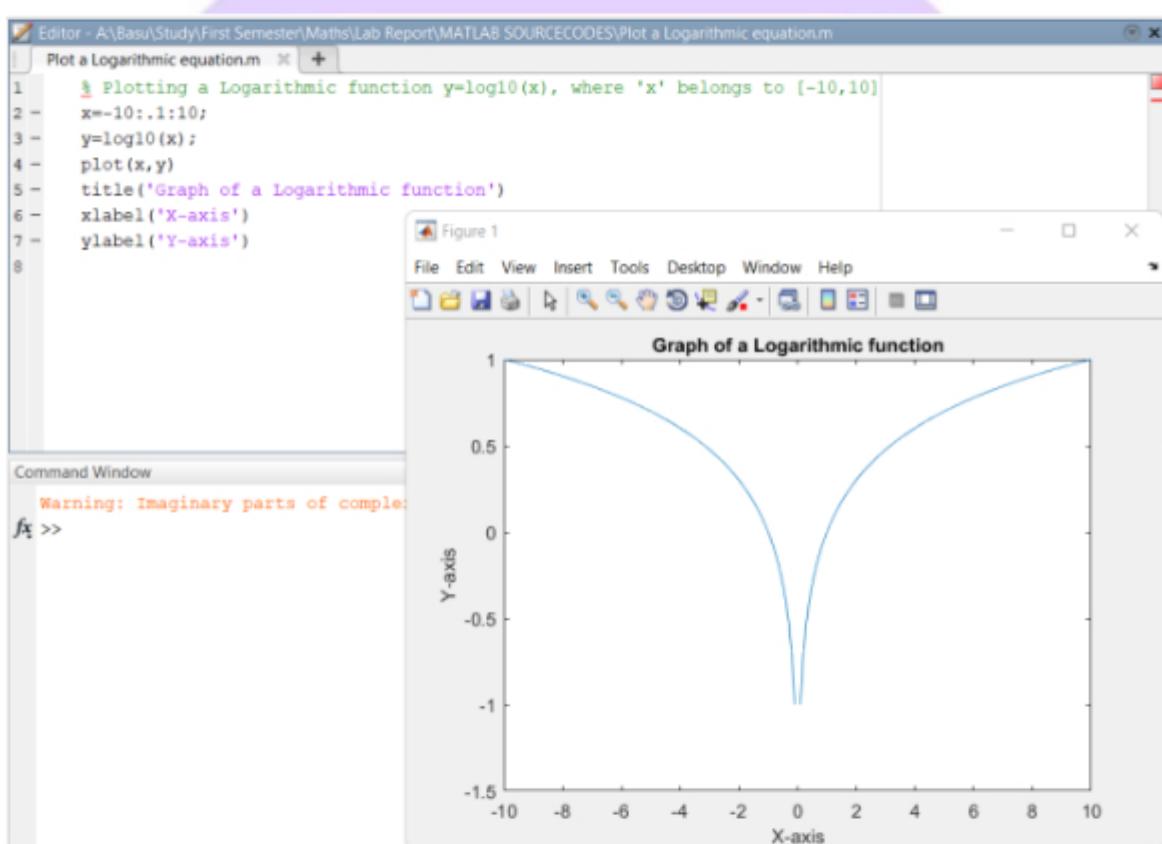
4.25: Plot a Logarithmic function.

Ans:



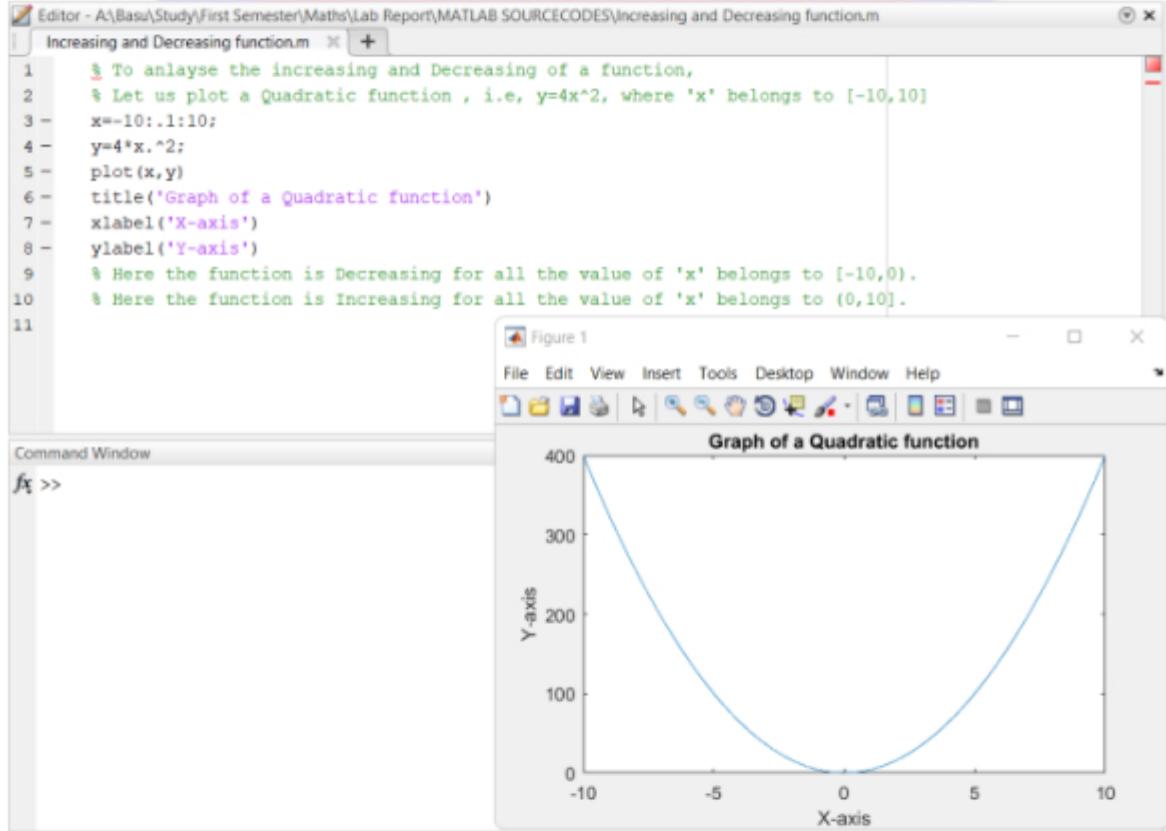
4.25: Plot a Logarithmic function.

Ans:



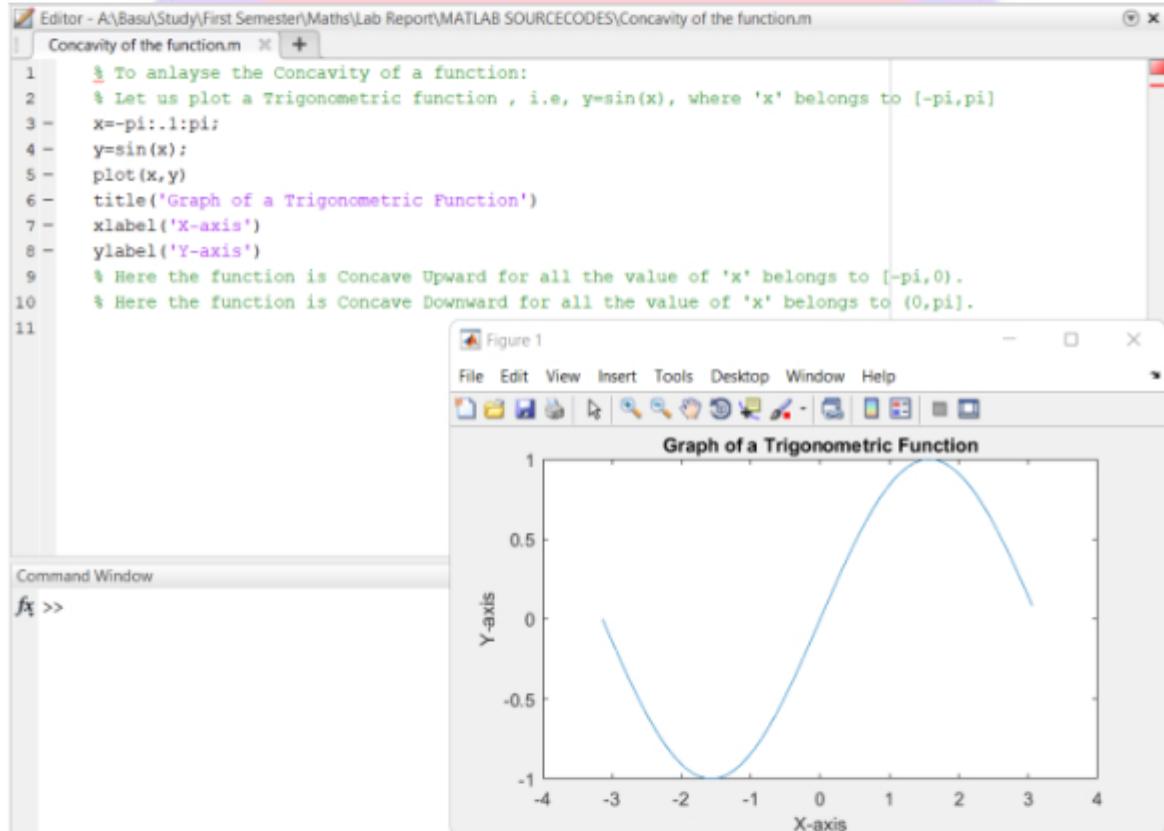
4.26: Give the sense of Increasing and Decreasing function in certain region.

Ans:



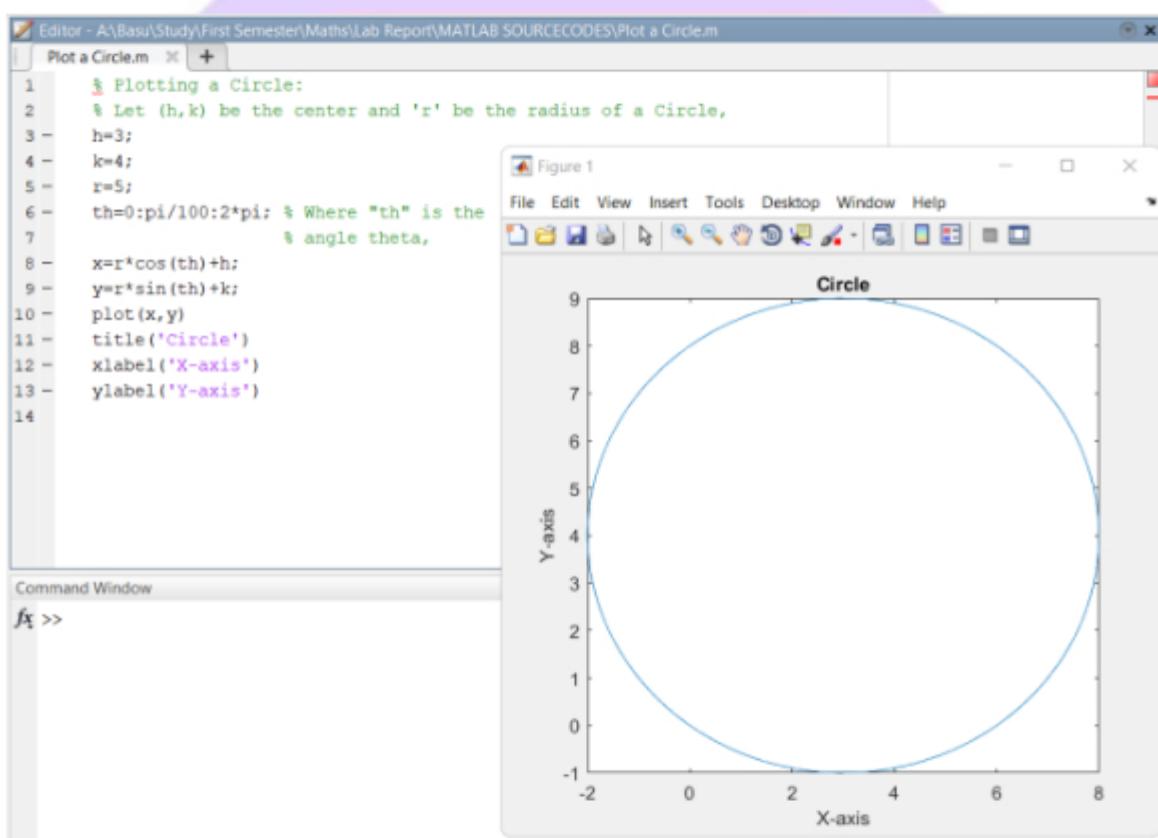
4.27: Give the sense of Concavity of the function in certain region.

Ans:



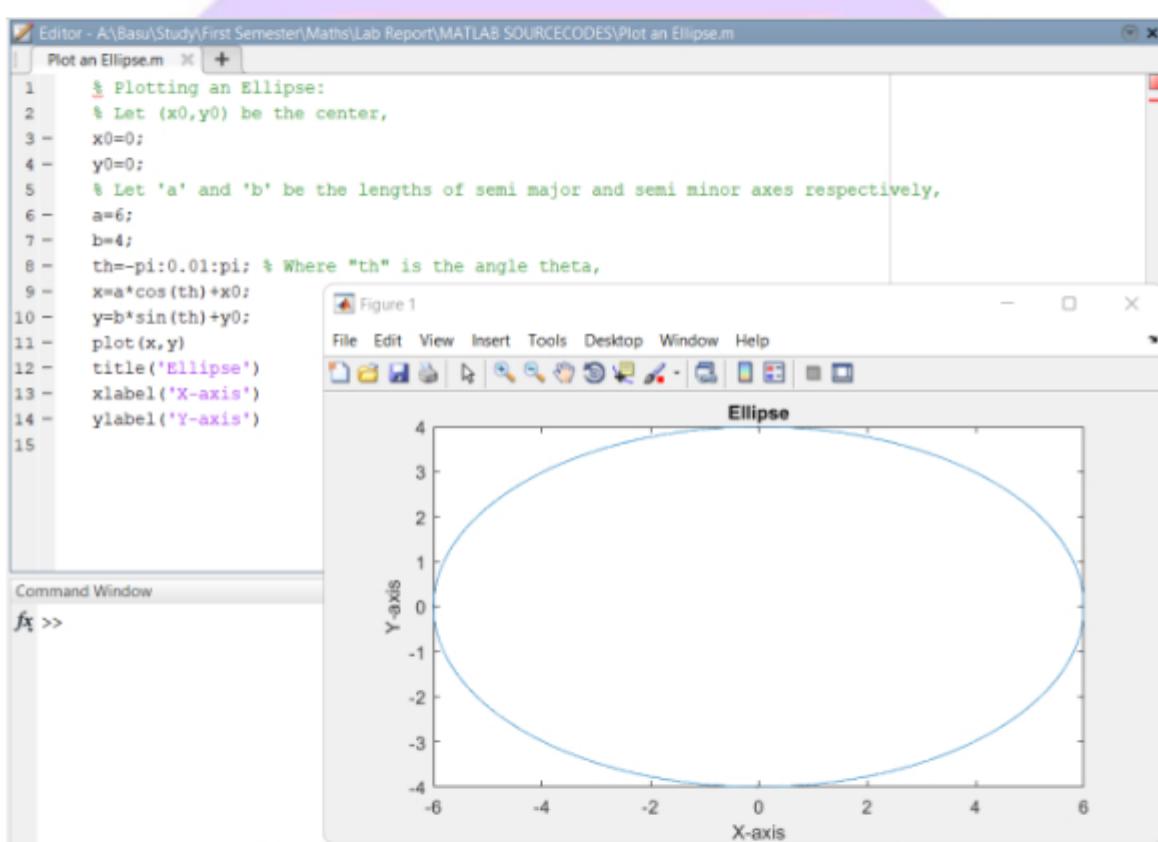
4.28: Plot a Circle.

Ans:



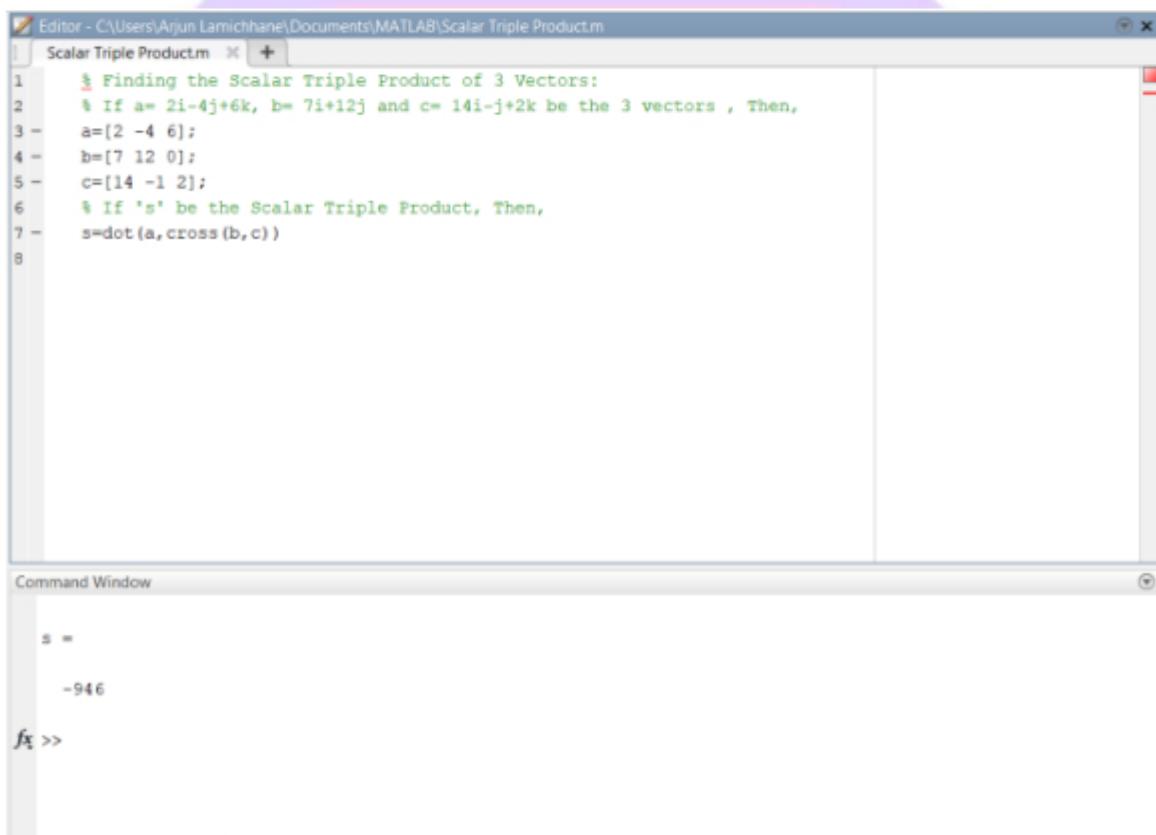
4.29: Plot an Ellipse.

Ans:



4.30: Find the Scalar triple product of three vectors.

Ans:



The image shows a MATLAB workspace with two windows. The top window is the 'Editor' showing a script named 'Scalar Triple Product.m'. The code in the editor is as follows:

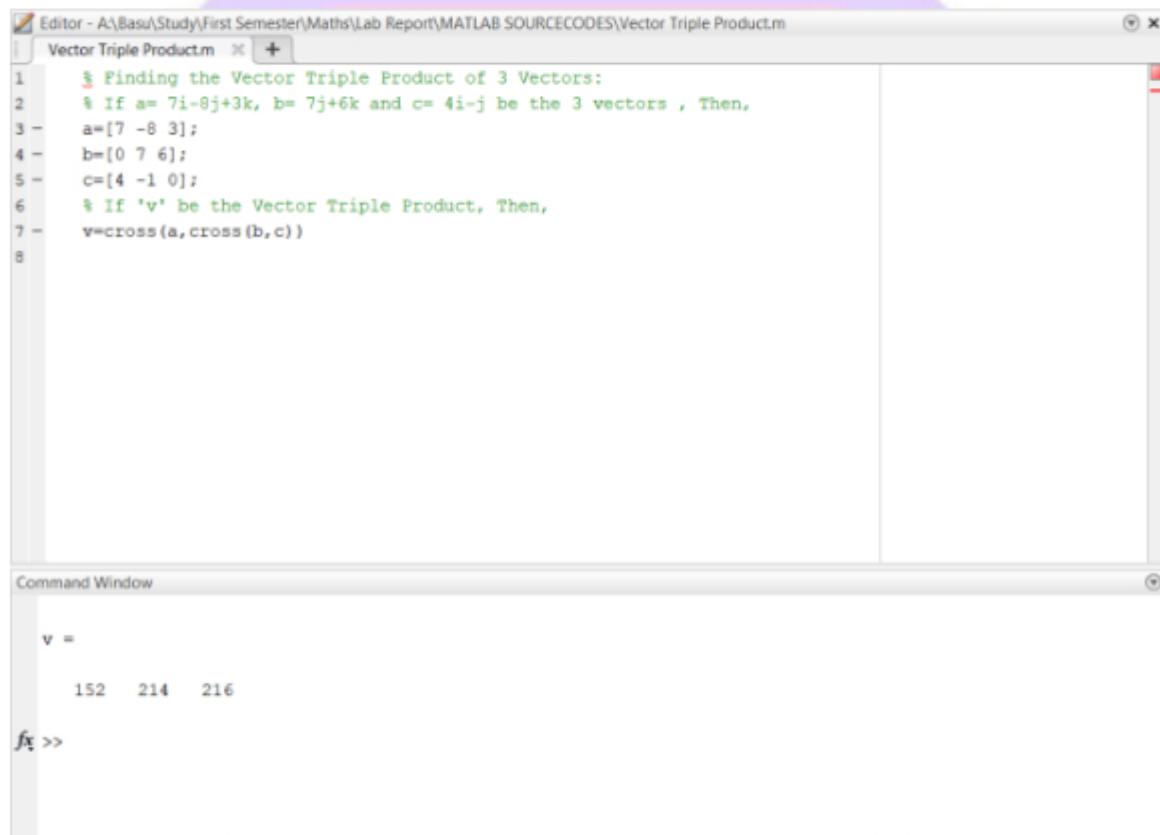
```
Editor - C:\Users\Arjun Lamichhane\Documents\MATLAB\Scalar Triple Product.m
Scalar Triple Product.m + ×
1 % Finding the Scalar Triple Product of 3 Vectors:
2 % If a= 2i-4j+6k, b= 7i+12j and c= 14i-j+2k be the 3 vectors , Then,
3 a=[2 -4 6];
4 b=[7 12 0];
5 c=[14 -1 2];
6 % If 's' be the Scalar Triple Product, Then,
7 s=dot(a,cross(b,c))
8
```

The bottom window is the 'Command Window' showing the output of the script:

```
Command Window
s =
-946
fx >>
```

4.31: Find the Vector triple product of three vectors.

Ans:



The image shows a MATLAB workspace with two windows. The top window is the 'Editor' showing a script named 'Vector Triple Product.m'. The code in the editor is as follows:

```
1 % Finding the Vector Triple Product of 3 Vectors:
2 % If a= 7i-8j+3k, b= 7j+6k and c= 4i-j be the 3 vectors , Then,
3 - a=[7 -8 3];
4 - b=[0 7 6];
5 - c=[4 -1 0];
6 % If 'v' be the Vector Triple Product, Then,
7 - v=cross(a,cross(b,c))
8
```

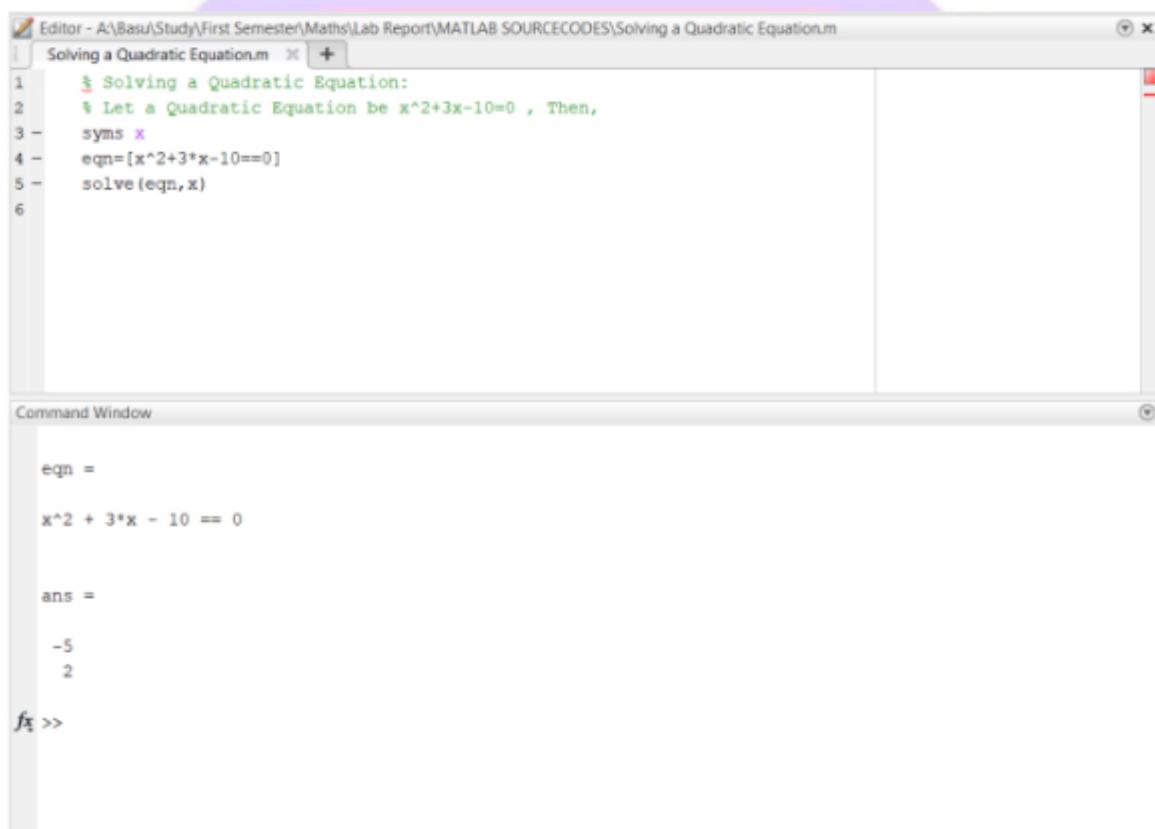
The bottom window is the 'Command Window' showing the output of the code:

```
v =
    152    214    216
```

At the bottom left of the command window, there is a small icon labeled 'fx'.

4.32: Solve a Quadratic Equation.

Ans:



The image shows a MATLAB interface with two windows. The top window is the 'Editor' showing a script named 'Solving a Quadratic Equation.m'. The code inside the editor is:

```
1 % Solving a Quadratic Equation:  
2 % Let a Quadratic Equation be x^2+3x-10=0 , Then,  
3 - syms x  
4 - eqn=[x^2+3*x-10==0]  
5 - solve(eqn,x)  
6
```

The bottom window is the 'Command Window' showing the execution results:

```
eqn =  
x^2 + 3*x - 10 == 0  
  
ans =  
-5  
2  
f1 >>
```