BCA Notes Nepal

Mathematica Lab Report

Mathematics I

Lab reports of Mathematica , mathematics subjects BCA First year First Semester..

2020

LabReport

College Name

College Address

TU Affiliated

Faculty of humanities and social science

Bachelor of computer application

College Logo

Report on

Mathematics i

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Submitted to:

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Abstract

It's our pleasure and duty to submit report of Mathematica. 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 Mathematica about how to solve mathematical problem in lab. This is the main point of view of this report.

Acknowledgement

I would like to express my special thanks of gratitude to our teacher" Mr. Sudhir Gautam" as well as our campus chief "Mr. Nishant Sakya" who gave us opportunity to make report of Mathematica which helped me in doing a lot of research & i came to know about many things so I am very thankful to them. I would like to thank friends & teacher who helped me in making this project with a limited frame of time.

Content

1.4 Vector

- **Lab-16**
- **Lab-17**

Software Application in Mathematica

Introduction: - There are many software applications which are available for mathematics, they are: -

Mathematica

Math lab

Moped

Magma

GAP etc.

But mainly we will study about two software. they are: -

***Mathematica*: -** Mathematica is a symbolic mathematic computation program some time called a computer Algebra program. It is commercial software started in 1998. It was conceived by Stephen Wolfram developed by wolfram research of campaign. The wolfram language is a programming language in Mathematica. it is used for general purpose in computer Algebra systems(CAS) and also use in main scientific engineering and Economic fields.

Feature of Mathematica: -

*It provide an interactive environment for interactive exploration design and problem solving.

*It provides tools for building application with custom graphic interface

*It provide vast library of Mathematica location for linear algebra etc.

* it provides function integration Mathematica based algorithms with external application and world form language such as c++, java.

Use of Mathematica

*to draw parabola, ellipse, circle etc.

it also help in the problem like geometrical problems it also helps in finding scientific value

1.Find the root of 2

In[1]:=

```
Sqrt[2]
```

Out[1]=

$$\sqrt{2}$$

In[2]:=

```
N[Sqrt[2]]
```

Out[2]=

```
1.41421
```

Q.N.2) Let f: R→R define by f(x)=2x+3, find f (5).

```
F[x_] = 2 x + 3

F[5]
```

Out[10]=

$$3 + 2x$$

Out[11]=

$$13$$

Q.N.3) Let f:R→R define by f(x)=2x+3 and g: R→R define by $g(x)=x^2$, then find fog(x) and gof(x).

```
In[6]:= F[x_] = 2 x + 3
        g[x_] = x^2
        F[g[x]]
        g[F[x]]
```

Out[6]=

$$3 + 2x$$

Out[7]=

$$x^2$$

Out[8]=

$$3 + 2x^2$$

Out[9]=

$$(3 + 2x)^2$$

Q.N.4) Let f:A→B define by $f(x)=x^2+2$, where

In[22]:=

```
F[x_] = x^2 + 2
A = {1, 2, 3}
F[A]
```

Out[22]=

$$2 + x^2$$

Out[23]=

$$\{1, 2, 3\}$$

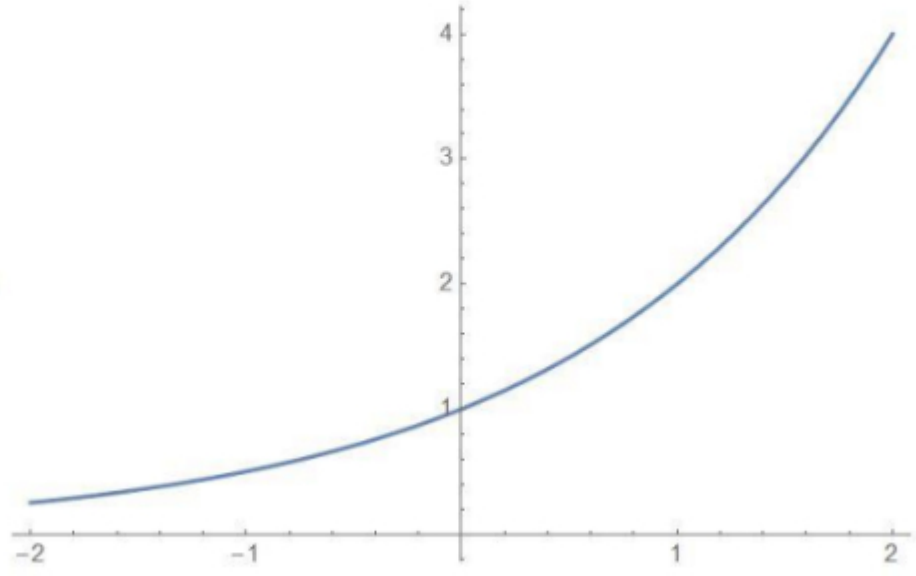
Out[24]=

$$\{3, 6, 11\}$$

Q.N.5) Draw the graph $y=2^x$ $(-2 \leq x \leq 2)$.

In[15]:= `Plot[2^x, {x, -2, 2}]`

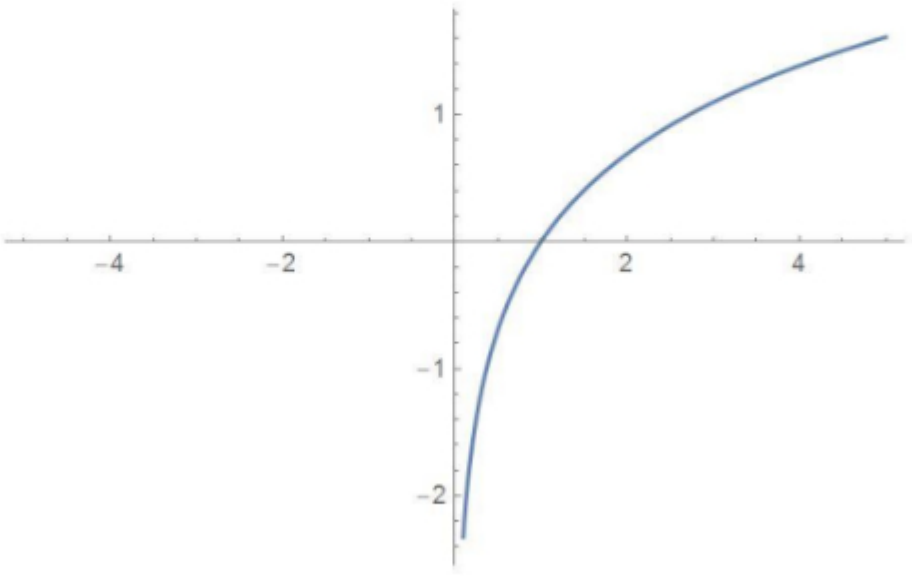
Out[15]=



Q.N.6) Draw the graph of y=logx(-5 ≤ x ≤ 5).

In[19]:= `Plot[Log[x], {x, -5, 5}]`

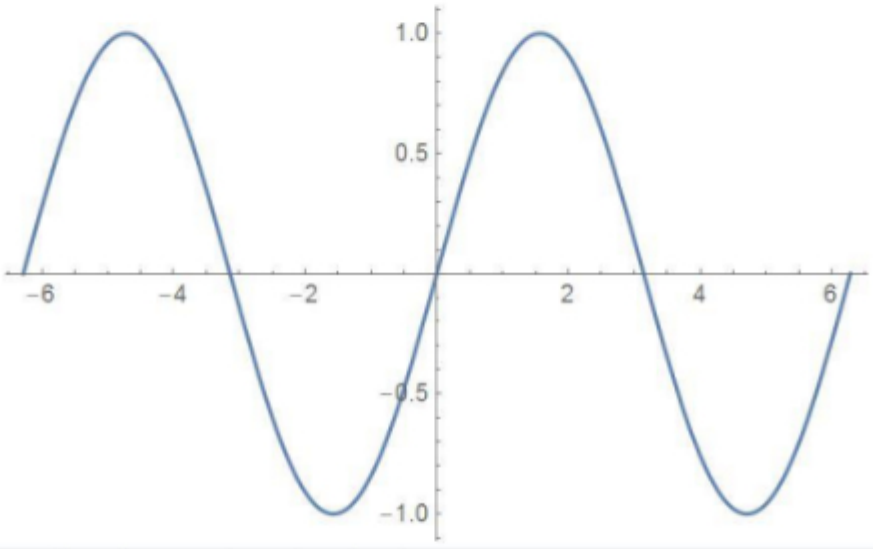
Out[19]=



7).Draw the graph of Y= sin X(-2π ≤X ≤ xπ)

```
In[21]:= Plot[Sin[x], {x, -2 Pi, 2 Pi}]
```

Out[21]=



8). To find AM & GM.

```
X = {4, 12}
Mean[X]
GeometricMean[X]
```

Out[1]= {4, 12}

Out[2]= 8

Out[3]= $4\sqrt{3}$

9). Find determinant of matrix.

```
In[15]:= matA = {{1, 2, 3}, {2, 1, 1}, {4, -1, 0}}
         Det[matA]

Out[15]= {{1, 2, 3}, {2, 1, 1}, {4, -1, 0}}

Out[16]= -9
```

10). Find the inverse of matrix.

```
matA = {{1, 1, 1}, {2, 1, 0}, {1, 0, 5}}
Inverse[matA]
```

$$\{\{1, 1, 1\}, \{2, 1, 0\}, \{1, 0, 5\}\}$$

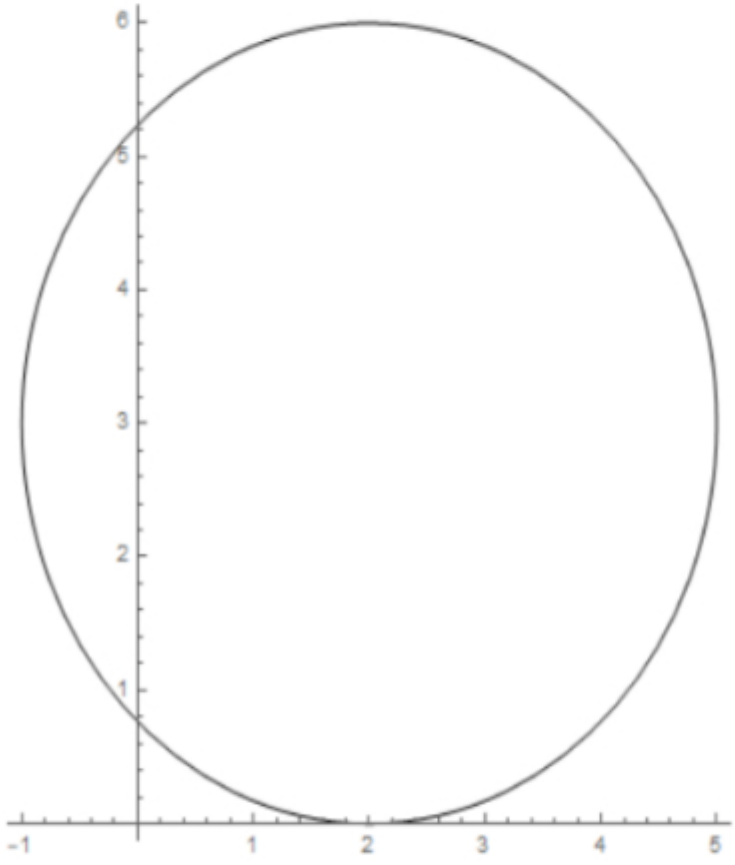
$$\left\{\left\{-\frac{5}{6}, \frac{5}{6}, \frac{1}{6}\right\}, \left\{\frac{5}{3}, -\frac{2}{3}, -\frac{1}{3}\right\}, \left\{\frac{1}{6}, -\frac{1}{6}, \frac{1}{6}\right\}\right\}$$

Assuming a matrix | Use as *a list of lists* instead

11) Plot a circle with center (2,3) and having radius 3.

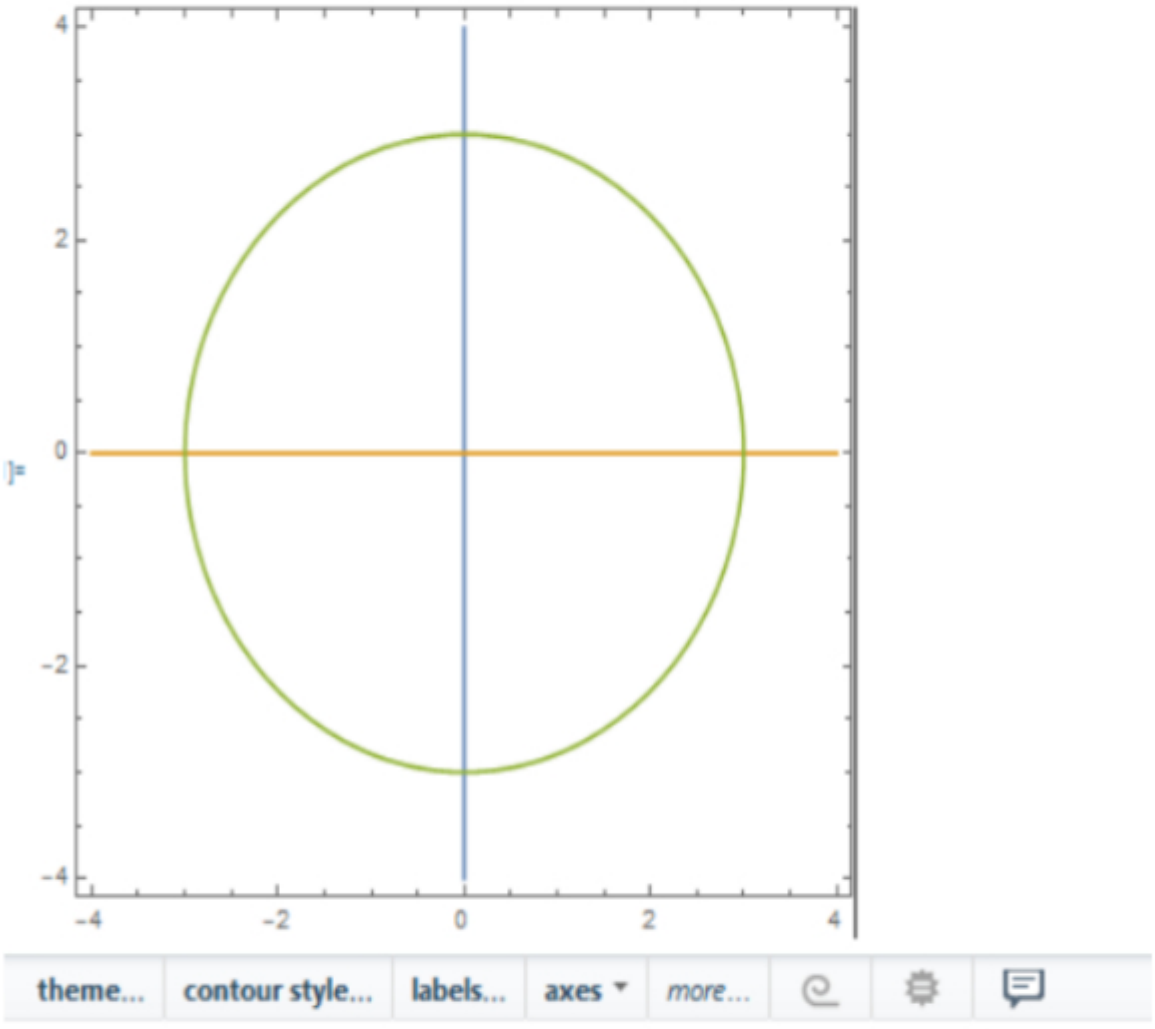
```
Graphics[Circle[{2, 3}, 3], Axes → True]
```

Out[1]=



12)Plot a circle x^2+y^2=9.

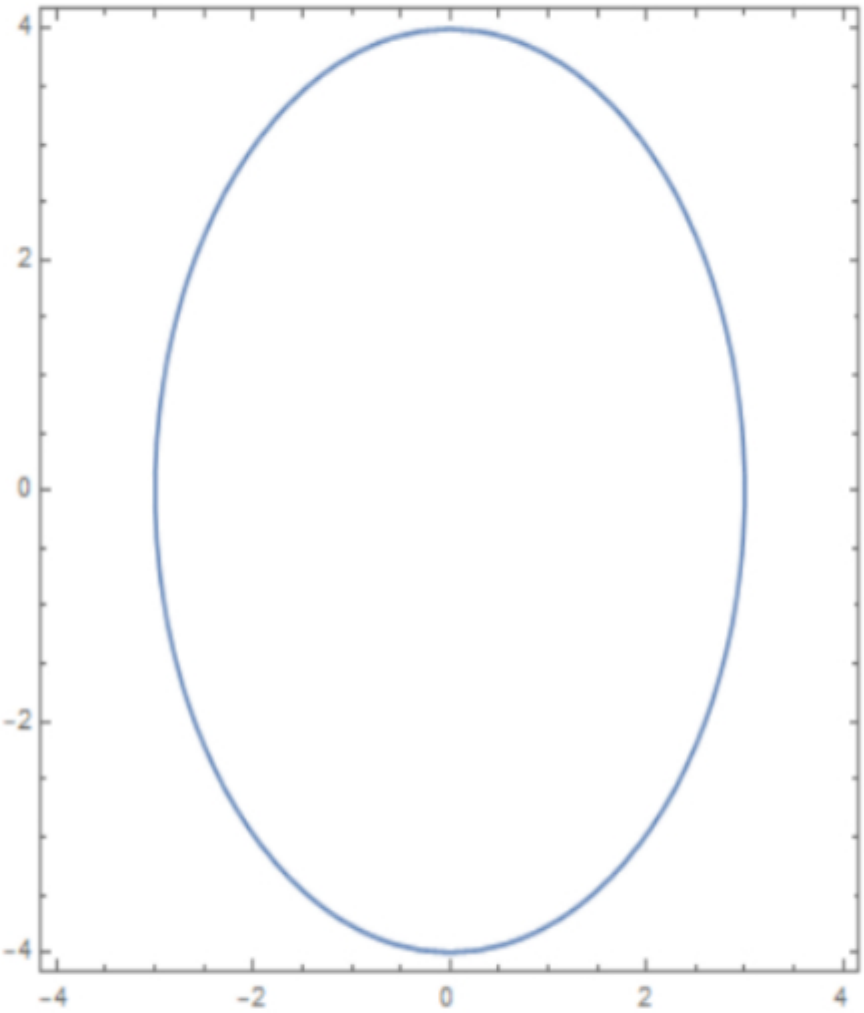
```
ContourPlot[{x == 0, y == 0, x^2 + y^2 == 9}, {x, -4, 4}, {y, -4, 4}]
```



13) Plot an ellipse x^2/9+y^2/16=1.

In[2]:=
```
ContourPlot[{x^2/9 + y^2/16 == 1}, {x, -4, 4}, {y, -4, 4}]
```

Out[2]=

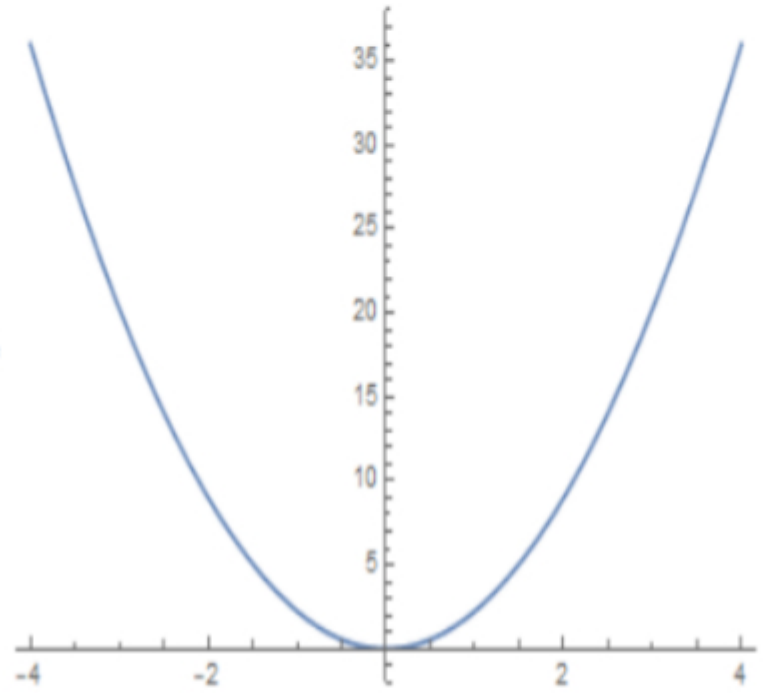


theme... | contour style... | labels... | axes | more...

14) Plot a parabola 9/4x^2.

```
In[4]:= Plot[9/4 x^2, {x, -4, 4}]
```

Out[4]=

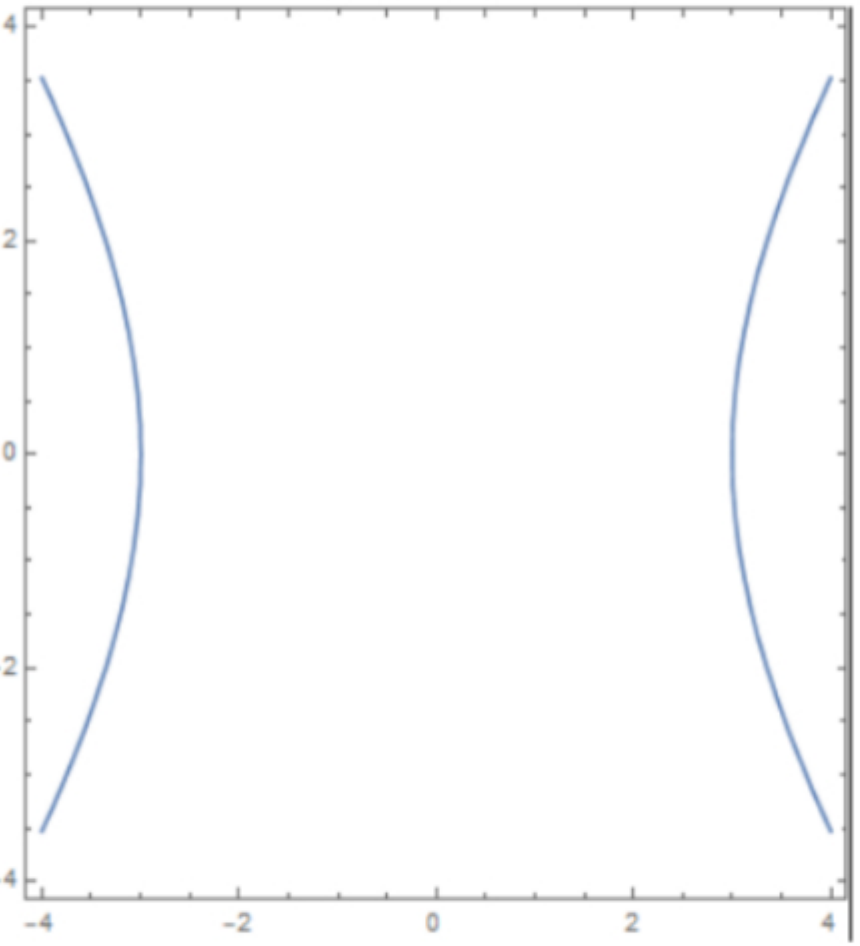


theme... labels... axes ▾ image size ▾ more...

15) Plot a hyperbola x^2/9-y^2/ 16==1.

```
In[5]:= ContourPlot[{x^2/9 - y^2/16 == 1}, {x, -4, 4}, {y, -4, 4}]
```

Out[5]=



16.Find the dot product, cross product & determinant of following vectors.

```
In[6]:= VecA = {1, 2, 3}
        VecB = {4, 5, 6}
        Dot[VecA, VecB]
        Cross[VecA, VecB]
        Norm[VecA]
Out[6]= {1, 2, 3}
Out[7]= {4, 5, 6}
Out[8]= 32
Out[9]= {-3, 6, -3}
Out[10]= √14
```

SNOIP

17. Find the scaler triple product [a,b,c] of three vectors A=[4,5,6], B=[2,-1,0] and C=[1,0,2].

Sol:-

```
In[17]:= VecA = {1, 2, 3}
         VecB = {2, -1, 0}
         VecC = {1, 0, 2}
         Dot[VecA, Cross[VecB, VecC]]
         Dot[VecB, Cross[VecC, VecA]]
         Dot[VecC, Cross[VecA, VecB]]

Out[17]= {1, 2, 3}

Out[18]= {2, -1, 0}

Out[19]= {1, 0, 2}

Out[20]= -7

Out[21]= -7

Out[22]= -7
```