#### 1

# **ASSIGNMENT 6**

## A.Tejasri

### Download all python codes from

https://github.com/tejasri3657/Assignment-6/blob/main/Assignment 6.py

#### Latex-tikz codes from

https://github.com/tejasri3657/Assignment-6/new/

#### 1 Question No 2.74(f)

In each of the following find the equation for the ellipse that satisfies the given condition:

1) Latus rectum length 8, foci  $\begin{pmatrix} \pm 3\sqrt{5} \\ 0 \end{pmatrix}$ 

#### 2 Solution

#### Given

Latus rectum length = 8

$$Foci = \begin{pmatrix} \pm 3\sqrt{5} \\ 0 \end{pmatrix} \tag{2.0.1}$$

$$\mathbf{c} = 3\sqrt{5} \tag{2.0.2}$$

since, foci on x-axis.

Equation of ellipse can be written as

$$\frac{x^2}{81} + \frac{y^2}{36} = 1 \tag{2.0.3}$$

we know,

$$c^2 = a^2 - b^2 (2.0.4)$$

$$(3\sqrt{5})^2 = a^2 - b^2 \tag{2.0.5}$$

$$\therefore a^2 - b^2 = 45 \tag{2.0.6}$$

Latus rectum length=8

$$\frac{2(b^2)}{a} = 8\tag{2.0.7}$$

$$b^2 = 4a (2.0.8)$$

$$a^2 + 4a = 45 \tag{2.0.9}$$

$$a^2 - 4a - 45 = 0 (2.0.10)$$

$$(a-9)(a+5) = 0 (2.0.11)$$

$$a = -5(or)a = 9 (2.0.12)$$

Since, a is distance, it can't be negative.

$$\therefore \mathbf{a} = 9 \tag{2.0.13}$$

$$b^2 = 4a = 36 \tag{2.0.14}$$

$$\implies b = 6 \tag{2.0.15}$$

Now,

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \tag{2.0.16}$$

putting values,

$$\frac{x^2}{81} + \frac{y^2}{36} = 1 \tag{2.0.17}$$

Plot of ellipse:

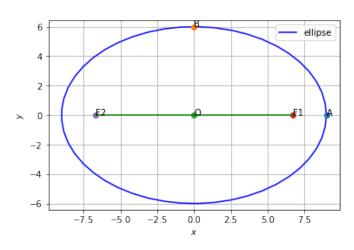


Fig. 2.1: Ellipse  $\frac{x^2}{81} + \frac{y^2}{36} = 1$