## AI24BTECH11016 - Jakkula Adishesh Balaji

## Intersection Of Conics(Chords)

## **Question:**

**9.2.13** Find the area of the region bounded by the ellipse  $\frac{x^2}{16} + \frac{y^2}{9} = 1$ Equation of curve in Matrix form is

$$\vec{x}^{\mathsf{T}} \vec{V} \vec{x} + 2 \vec{u}^{\mathsf{T}} \vec{x} + f = 0 \tag{1}$$

For the given ellipse, The values of  $\vec{V}, \vec{u}, f$  are

$$\vec{V} = \begin{pmatrix} 9 & 0 \\ 0 & 16 \end{pmatrix} \tag{.2}$$

$$\vec{u} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{.3}$$

$$f = -144 \tag{.4}$$

The area under the curve is given by

$$A = 4 \int_0^4 3\sqrt{1 - \frac{x^2}{16}} \, dx \tag{.5}$$

$$A = 12\pi \tag{.6}$$

Parameter	Description	Values
V	$ \vec{n}^2  - e^2 \vec{n} \vec{n}^T$	$\begin{pmatrix} 9 & 0 \\ 0 & 16 \end{pmatrix}$
и	$ce^2\vec{n} -  \vec{n}^2 \vec{F}$	$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$
A	Area under Curve	$12\pi$
f	$ \vec{n}^2   \vec{F}^2  - c^2 e^2$	-144

PARAMETERS USED

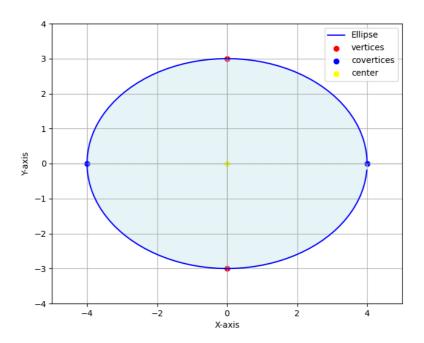


Fig. .1. Plot of ellipse