

# 9-9.2-13

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## 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

$$\vec{x}^T \vec{V} \vec{x} + 2\vec{u}^T \vec{x} + f = 0 \quad (1)$$

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

$$\vec{V} = \begin{pmatrix} 9 & 0 \\ 0 & 16 \end{pmatrix} \quad (2)$$

$$\vec{u} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \quad (3)$$

$$f = -144 \quad (4)$$

The area under the curve is given by

$$A = 4 \int_0^4 3 \sqrt{1 - \frac{x^2}{16}} dx \quad (5)$$

$$A = 12\pi \quad (6)$$

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

TABLE .I  
PARAMETERS USED

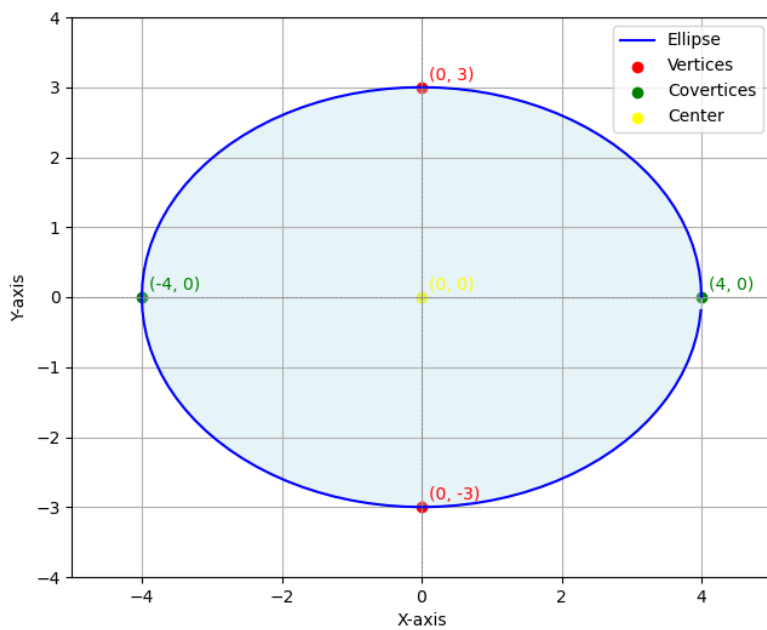


Fig. .1. Plot of ellipse