

# Assignment No.5

Sravani sandya

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<https://github.com/sravani706/Assignment5/main/main.tex>

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Question taken from

Quadratic\_forms, exercise 2

## 1 QUESTION No 2.30

Find the equation of the hyperbola with vertices  $\begin{pmatrix} 0 \\ \pm \frac{\sqrt{11}}{2} \end{pmatrix}$  and foci are  $\begin{pmatrix} 0 \\ \pm 3 \end{pmatrix}$

## 2 SOLUTION

We have been provided with values for vertices and foci

The given vertices are-  $\begin{pmatrix} 0 \\ \pm \frac{\sqrt{11}}{2} \end{pmatrix}$

The given vertices are in the form of  $\begin{pmatrix} 0 \\ \pm 3 \end{pmatrix}$  Here,

The major axis is along X axis

The equation of hyperbola is

$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

Thus, based on the values of vertices and equation form

$$a = \frac{\sqrt{11}}{2} \quad (2.0.1)$$

$$a^2 = \frac{11}{2} \quad (2.0.2)$$

Also, The given coordinate of foci are  $\begin{pmatrix} 0 \\ \pm 3 \end{pmatrix}$  We

know that foci =  $\begin{pmatrix} 0 \\ \pm c \end{pmatrix}$

$$\text{Thus } C = 3 \quad (2.0.3)$$

We know that,

$$c^2 = a^2 + b^2 \quad (2.0.4)$$

$$3^2 = \frac{11}{2} + b^2 \quad (2.0.5)$$

$$b^2 = \frac{11}{2} - 3^2 \quad (2.0.6)$$

$$b^2 = \frac{36 - 11}{2} \quad (2.0.7)$$

$$b^2 = \frac{25}{2} \quad (2.0.8)$$

The equation of hyperbola is-

$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1 \quad (2.0.9)$$

substitute the values to get equation for hyperbola-

$$\frac{y^2}{\frac{11}{2}} + \frac{x^2}{\frac{25}{2}} = 1 \quad (2.0.10)$$

$$100y^2 - 44x^2 = 275 \quad (2.0.11)$$

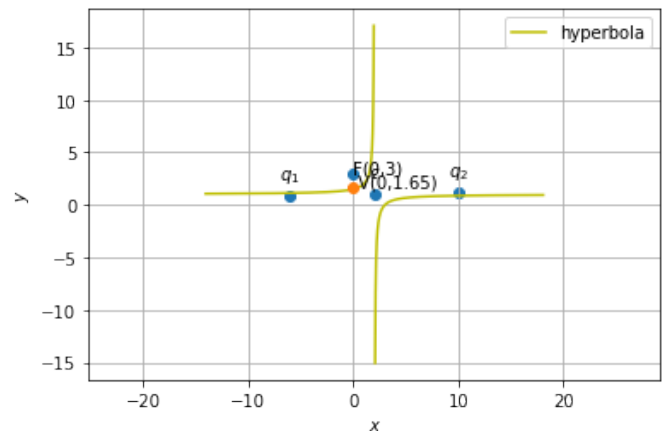


Fig. 0: Hyperbola