# Assignment 1

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Find Python Codes from below link

https://github.com/RaghavendraKulkarni/internship/blob/main/Assignment1/Assignment1.py

and latex-tikz codes from

https://github.com/RaghavendraKulkarni/internship/blob/main/Assignment1/assignment1.tex

## 1 Examples 1

### 1.1 Question

A line of length 10 and one end is at point (2, -3); if the abscissa of the other end be 10, Prove that its ordinate must be 3 or -9.

$$\begin{pmatrix}2\\-3\end{pmatrix},\begin{pmatrix}10\\y_1\end{pmatrix} \tag{1.1.1}$$

### 1.2 Solution

1) The distance between two vectors is given by

$$\|\mathbf{A}-\mathbf{B}\| = \sqrt{\left(\mathbf{A}-\mathbf{B}\right)^{\mathsf{T}}\left(\mathbf{A}-\mathbf{B}\right)} \tag{1.2.1}$$

Let

$$\mathbf{A} = \begin{pmatrix}2\\-3\end{pmatrix}, \mathbf{B} = \begin{pmatrix}10\\y_1\end{pmatrix} \tag{1.2.2}$$

$$\mathbf{A}-\mathbf{B} = \begin{pmatrix}-8\\-3-y_1\end{pmatrix} \tag{1.2.3}$$

Given Distance between $\mathbf{A}$ and $\mathbf{B}$ is 10
From (1.2.1) (1.2.3)

$$\left\|\begin{pmatrix}-8\\-3-y_1\end{pmatrix}\right\| = 10 \tag{1.2.4}$$

$$\sqrt{\begin{pmatrix}-8\\-3-y_1\end{pmatrix}^{\mathsf{T}}\begin{pmatrix}-8\\-3-y1\end{pmatrix}} = 10 \tag{1.2.5}$$

$$\sqrt{\begin{pmatrix}-8 & -3-y_1\end{pmatrix}\begin{pmatrix}-8\\-3-y_1\end{pmatrix}} = 10 \tag{1.2.6}$$

$$\sqrt{\left(-8\right)^2+\left(-3-y_1\right)^2} = 10 \tag{1.2.7}$$

$$\left(-8\right)^2+\left(-3-y_1\right)^2 = 10^2 \tag{1.2.8}$$

$$64+9+6y_1+y_1^2 = 100 \tag{1.2.9}$$

$$= y_1^2+6y_1-27 \tag{1.2.10}$$

On solving for $y_1$ in above quadratic equation

$$\implies y_1 = -6+\sqrt{144}, y_1 = -6-\sqrt{144} \tag{1.2.11}$$

$$\implies y_1 = 3, y_1 = -9 \tag{1.2.12}$$

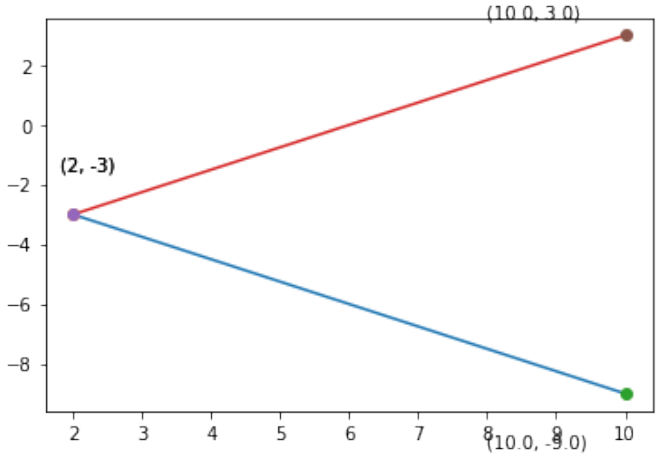


Fig. 1

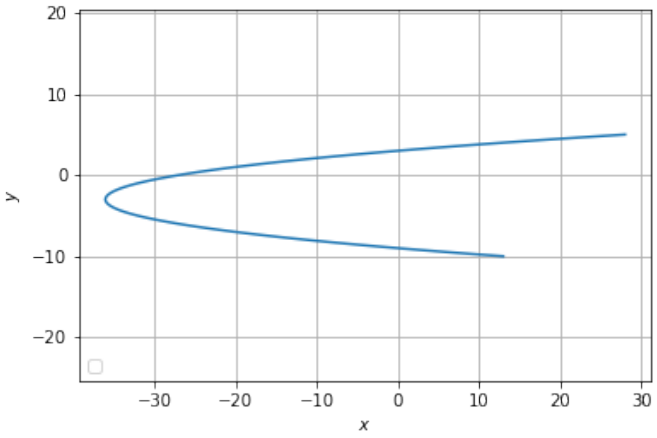


Fig. 1