Assignment 1

Raghavendra Kulkarni

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

Question 10

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

$$\begin{pmatrix}2\\-3\end{pmatrix},\begin{pmatrix}10\\y_1\end{pmatrix} \tag{1.0.1}$$

1.1 Solution

The distance between two vectors is given by

$$\|\mathbf{A}-\mathbf{B}\| = \sqrt{\left(\mathbf{A}-\mathbf{B}\right)^{\mathsf{T}}\left(\mathbf{A}-\mathbf{B}\right)} \tag{1.1.1}$$

Let

$$\mathbf{A} = \begin{pmatrix}2\\-3\end{pmatrix}, \mathbf{B} = \begin{pmatrix}10\\y_1\end{pmatrix} \tag{1.1.2}$$

$$\mathbf{A}-\mathbf{B} = \begin{pmatrix}-8\\-3-y_1\end{pmatrix} \tag{1.1.3}$$

Given Distance between **A** and **B** is 10

From (1.1.1) (1.1.3)

$$\left\|\begin{pmatrix}-8\\-3-y_1\end{pmatrix}\right\| = 10 \tag{1.1.4}$$

$$\sqrt{\begin{pmatrix}-8\\-3-y_1\end{pmatrix}^{\mathsf{T}}\begin{pmatrix}-8\\-3-y1\end{pmatrix}} = 10 \tag{1.1.5}$$

$$\sqrt{\begin{pmatrix}-8 & -3-y_1\end{pmatrix}\begin{pmatrix}-8\\-3-y_1\end{pmatrix}} = 10 \tag{1.1.6}$$

$$\sqrt{\left(-8\right)^2+\left(-3-y_1\right)^2} = 10 \tag{1.1.7}$$

$$\left(-8\right)^2+\left(-3-y_1\right)^2 = 10^2 \tag{1.1.8}$$

$$64+9+6y_1+y_1^2 = 100 \tag{1.1.9}$$

$$= y_1^2+6y_1-27 \tag{1.1.10}$$

On solving for y_1 in above quadratic equation

$$\implies y_1 = -6+\sqrt{144}, y_1 = -6-\sqrt{144} \tag{1.1.11}$$

$$\implies y_1 = 3, y_1 = -9 \tag{1.1.12}$$

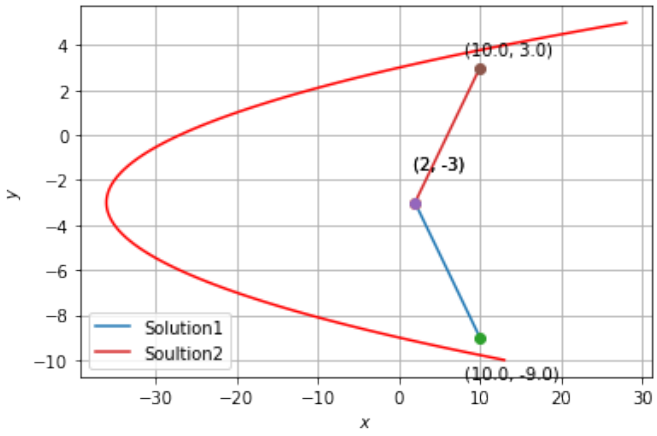

Fig. 0