

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

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

$$\begin{pmatrix} 2 \\ -3 \end{pmatrix}, \begin{pmatrix} 10 \\ y_1 \end{pmatrix} \quad (1.0.1)$$

1.1 Solution

The distance between two vectors is given by

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{(\mathbf{A} - \mathbf{B})^\top (\mathbf{A} - \mathbf{B})} \quad (1.1.1)$$

Let

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

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

Given Distance between \mathbf{A} and \mathbf{B} is 10

From (1.1.1) (1.1.3)

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

$$\sqrt{\begin{pmatrix} -8 \\ -3 - y_1 \end{pmatrix}^\top \begin{pmatrix} -8 \\ -3 - y_1 \end{pmatrix}} = 10 \quad (1.1.5)$$

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

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

$$(-8)^2 + (-3 - y_1)^2 = 10^2 \quad (1.1.8)$$

$$64 + 9 + 6y_1 + y_1^2 = 100 \quad (1.1.9)$$

$$= y_1^2 + 6y_1 - 27 \quad (1.1.10)$$

On solving for y_1 in above quadratic equation

$$\Rightarrow y_1 = -6 + \sqrt{144}, y_1 = -6 - \sqrt{144} \quad (1.1.11)$$

$$\Rightarrow y_1 = 3, y_1 = -9 \quad (1.1.12)$$

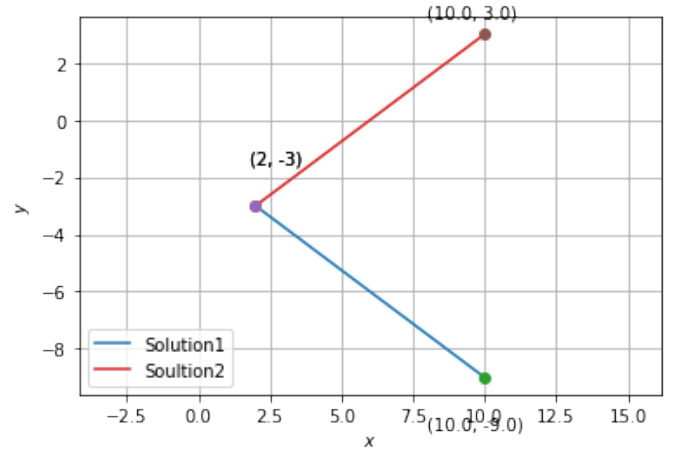


Fig. 0