Assignment 1

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Find Python Codes from below link

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

and latex-tikz codes from

https://github.com/HimaMadhu/internship/blob/main/assignment1/assignment%201.tex

1 Examples 1

Question 1

Find the value of x_1 if the distance between the points $(x_1, 2)$ and $(3, 4)$ be 8

$$\begin{pmatrix} x_1 \\ 2 \end{pmatrix}, \begin{pmatrix} 3 \\ 4 \end{pmatrix} \tag{1.0.1}$$

1.1 Solution

The distance between two vectors is given by

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

Let

$$\mathbf{A} = \begin{pmatrix} x_1 \\ 2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 3 \\ 4 \end{pmatrix} \tag{1.1.2}$$

$$\mathbf{A}-\mathbf{B} = \begin{pmatrix} x_1 - 3 \\ -2 \end{pmatrix} \tag{1.1.3}$$

Given Distance between $\mathbf{A}$ and $\mathbf{B}$ is 8

From (1.1.1) (1.1.3)

$$\left\| \begin{pmatrix} x_1 - 3 \\ -2 \end{pmatrix} \right\| = 8 \tag{1.1.4}$$

$$\sqrt{\begin{pmatrix} x_1 - 3 \\ -2 \end{pmatrix}^{\top} \begin{pmatrix} x_1 - 3 \\ -2 \end{pmatrix}} = 8 \tag{1.1.5}$$

$$\sqrt{\begin{pmatrix} x_1 - 3 & -2 \end{pmatrix} \begin{pmatrix} x_1 - 3 \\ -2 \end{pmatrix}} = 8 \tag{1.1.6}$$

$$\sqrt{(x_1 - 3)^2 + (-2)^2} = 8 \tag{1.1.7}$$

$$(x_1 - 3)^2 + (-2)^2 = 8^2 \tag{1.1.8}$$

$$x_1^2 - 6x_1 + 9 + 4 = 64 \tag{1.1.9}$$

$$= x_1^2 - 6x_1 - 51 \tag{1.1.10}$$

On solving for x_1 in above quadratic equation

$$\implies x_1 = 3 + 2\sqrt{15}, x_1 = 3 - 2\sqrt{15} \tag{1.1.11}$$

$$\implies x_1 = 10.745, x_1 = -4.745 \tag{1.1.12}$$

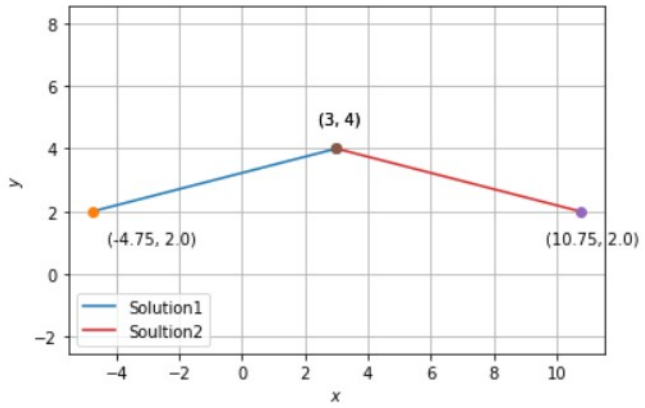

Fig. 0