

Assignment No.1

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Download all python codes from

and latex-tikz codes from

<https://github.com/suyogtangade/AI.git>

Which can be simplified to obtain

$$\begin{pmatrix} 8 & 0 \end{pmatrix} \mathbf{P} = 24 \implies x = 3 \quad (1.0.11)$$

The required point

$$\mathbf{P} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}. \quad (1.0.12)$$

1 QUESTION No.16(B) (CBSE/2006/SET-2)

Find the co-ordinates of the point equidistant from three given points $\mathbf{A} \begin{pmatrix} 5 \\ 3 \end{pmatrix}$, $\mathbf{B} \begin{pmatrix} 5 \\ -5 \end{pmatrix}$ and $\mathbf{C} \begin{pmatrix} 1 \\ -5 \end{pmatrix}$

Solution:

Let the point equidistant from \mathbf{A} & \mathbf{B} & \mathbf{C} be

$$\mathbf{P} = \begin{pmatrix} x \\ y \end{pmatrix} \quad (1.0.1)$$

From the given information

$$\|\mathbf{P} - \mathbf{A}\|^2 = \|\mathbf{P} - \mathbf{B}\|^2 = \|\mathbf{P} - \mathbf{C}\|^2 \quad (1.0.2)$$

$$\therefore \|\mathbf{P} - \mathbf{A}\|^2 = \|\mathbf{P} - \mathbf{B}\|^2 \quad (1.0.3)$$

$$\left\| \mathbf{P} - \begin{pmatrix} 5 \\ 3 \end{pmatrix} \right\|^2 = \left\| \mathbf{P} - \begin{pmatrix} 5 \\ -5 \end{pmatrix} \right\|^2 \quad (1.0.4)$$

$$\implies \|\mathbf{P}\|^2 + \left\| \begin{pmatrix} 5 \\ 3 \end{pmatrix} \right\|^2 - 2\mathbf{A}^T \mathbf{P} \quad (1.0.5)$$

$$= \|\mathbf{P}\|^2 + \left\| \begin{pmatrix} 5 \\ -5 \end{pmatrix} \right\|^2 - 2\mathbf{B}^T \mathbf{P} \quad (1.0.6)$$

Which can be simplified to obtain

$$\begin{pmatrix} 0 & 16 \end{pmatrix} \mathbf{P} = -16 \implies y = -1 \quad (1.0.7)$$

$$\left\| \mathbf{P} - \begin{pmatrix} 5 \\ -5 \end{pmatrix} \right\|^2 = \left\| \mathbf{P} - \begin{pmatrix} 1 \\ -5 \end{pmatrix} \right\|^2 \quad (1.0.8)$$

$$\implies \|\mathbf{P}\|^2 + \left\| \begin{pmatrix} 5 \\ -5 \end{pmatrix} \right\|^2 - 2\mathbf{B}^T \mathbf{P} \quad (1.0.9)$$

$$= \|\mathbf{P}\|^2 + \left\| \begin{pmatrix} 1 \\ -5 \end{pmatrix} \right\|^2 - 2\mathbf{C}^T \mathbf{P} \quad (1.0.10)$$