

EE2802: Assignment3

Nikam Pratik Balasaheb (EE21BTECH11037)

1 PROBLEM

Find the point on x -axis that is equidistant from points $\begin{pmatrix} 7 \\ 6 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$

2 SOLUTION

The given point (say \mathbf{P}) is equidistant from

$$\mathbf{A} = \begin{pmatrix} 7 \\ 6 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{B} = \begin{pmatrix} 3 \\ 4 \end{pmatrix} \quad (2.0.2)$$

$$\Rightarrow \|\mathbf{A} - \mathbf{P}\|^2 = \|\mathbf{B} - \mathbf{P}\|^2 \quad (2.0.3)$$

$$\|\mathbf{A}\|^2 - 2\mathbf{A}^\top \mathbf{P} + \|\mathbf{P}\|^2 = \|\mathbf{B}\|^2 - 2\mathbf{B}^\top \mathbf{P} + \|\mathbf{P}\|^2 \quad (2.0.4)$$

$$(2\mathbf{B}^\top - 2\mathbf{A}^\top) \mathbf{P} = \|\mathbf{B}\|^2 - \|\mathbf{A}\|^2 \quad (2.0.5)$$

$$\begin{pmatrix} 2 & 1 \end{pmatrix} \mathbf{P} = 15 \quad (2.0.6)$$

Also, \mathbf{P} lies on x -axis

$$\Rightarrow \begin{pmatrix} 0 & 1 \end{pmatrix} \mathbf{P} = 0 \quad (2.0.7)$$

$$\begin{pmatrix} 2 & 1 \\ 0 & 1 \end{pmatrix} \mathbf{P} = \begin{pmatrix} 15 \\ 0 \end{pmatrix} \quad (2.0.8)$$

Augmented matrix,

$$\begin{pmatrix} 2 & 1 & 15 \\ 0 & 1 & 0 \end{pmatrix} \quad (2.0.9)$$

$$\xleftrightarrow{R_1 \leftarrow \frac{1}{2}(R_1 - R_2)} \quad (2.0.10)$$

$$\begin{pmatrix} 1 & 0 & \frac{15}{2} \\ 0 & 1 & 0 \end{pmatrix} \quad (2.0.11)$$

$$\therefore, \mathbf{P} = \begin{pmatrix} \frac{15}{2} \\ 0 \end{pmatrix} \quad (2.0.12)$$

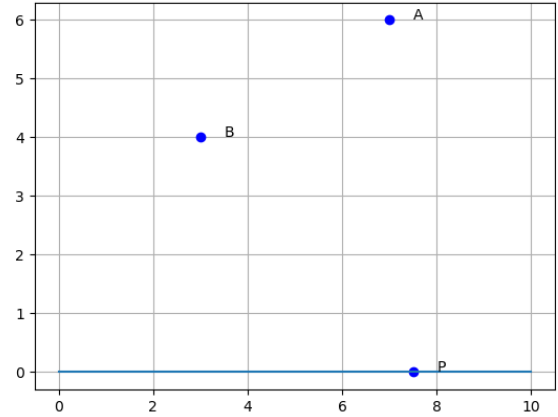


Fig. 0: Figure1