

EE2802: Assignment3

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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 P) is equidistant from $\mathbf{A} = \begin{pmatrix} 7 \\ 6 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

$$\Rightarrow \|\mathbf{A} - \mathbf{P}\|^2 = \|\mathbf{B} - \mathbf{P}\|^2$$

$$\|\mathbf{A}\|^2 - 2\mathbf{A}^T \mathbf{P} + \|\mathbf{P}\|^2 = \|\mathbf{B}\|^2 - 2\mathbf{B}^T \mathbf{P} + \|\mathbf{P}\|^2$$

$$(2\mathbf{B}^T - 2\mathbf{A}^T) \mathbf{P} = \|\mathbf{B}\|^2 - \|\mathbf{A}\|^2$$

$$\begin{pmatrix} 2 & -1 \end{pmatrix} \mathbf{P} = 15$$

Also, P lies on $x-axis$
 $\Rightarrow \begin{pmatrix} 0 & -1 \end{pmatrix} \mathbf{P} = 0$

$$\begin{pmatrix} 2 & 1 \\ 0 & 1 \end{pmatrix} \mathbf{P} = \begin{pmatrix} 15 \\ 0 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{P} = \begin{pmatrix} \frac{1}{2} & -\frac{1}{2} \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 15 \\ 0 \end{pmatrix} \quad (2.0.2)$$

$$\mathbf{P} = \begin{pmatrix} 7.5 \\ 0 \end{pmatrix} \quad (2.0.3)$$

