1-1.9-26

EE24BTECH11006 - Arnav Mahishi

Q) Find the value of k, if the point $P(2,4)$ is equidistant from the points $A(5,k)$ and $P(k,7)$.

Point	X	Y
P	2	4
A	5	k
B	k	7

TABLE 0: Input Parameters

$$|AP| = |PB| \implies (A-P)^T (A-P) = (B-P)^T (B-P) \tag{0.1}$$

$$\implies \begin{pmatrix} 3 \\ k-4 \end{pmatrix}^T \begin{pmatrix} 3 \\ k-4 \end{pmatrix} = \begin{pmatrix} k-2 \\ 3 \end{pmatrix}^T \begin{pmatrix} k-2 \\ 3 \end{pmatrix} \tag{0.2}$$

$$\implies \begin{pmatrix} 3 & k-4 \end{pmatrix} \begin{pmatrix} 3 \\ k-4 \end{pmatrix} = \begin{pmatrix} k-2 & 3 \end{pmatrix} \begin{pmatrix} k-2 \\ 3 \end{pmatrix} \tag{0.3}$$

$$\implies (k-4)^2 + 9 = (k-2)^2 + 9 \tag{0.4}$$

$$\implies (k-4) = \pm (k-2) \tag{0.5}$$

$$\therefore k = 3 \tag{0.6}$$

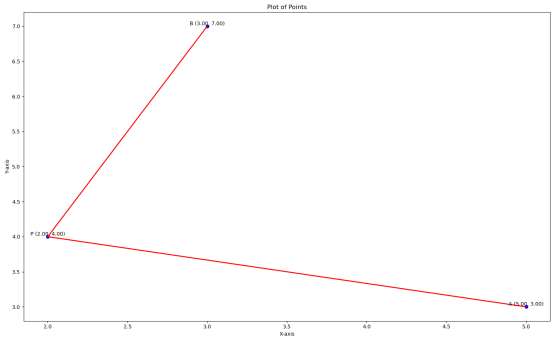

Fig. 0.1: Plot of points