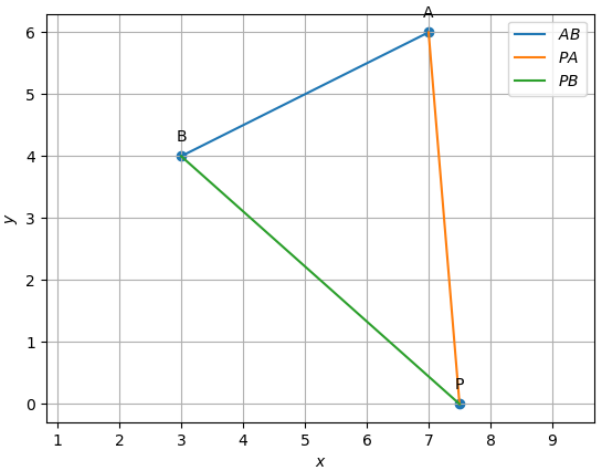
Line Assignment

Hari Venkateswarlu

September 2022

***Problem Statement* - Find a point on the x-axis,which is equidistant from the points** $\begin{pmatrix}7\\6\end{pmatrix}$ **and** $\begin{pmatrix}3\\4\end{pmatrix}$

1. finding the point on x-axis which is equidistant from the points



Solution

1. Given points A=$\begin{pmatrix}7\\6\end{pmatrix}$ and B=$\begin{pmatrix}3\\4\end{pmatrix}$
2. If the point is lying on x-axis then y-axis will be zero i.e.. y=0
3. Distance between the points $\begin{pmatrix}7\\6\end{pmatrix}$ and $\begin{pmatrix}x\\0\end{pmatrix}$ is equal to distance between the points $\begin{pmatrix}3\\4\end{pmatrix}$ and $\begin{pmatrix}x\\0\end{pmatrix}$
4. Consider P on x-axis P$\begin{pmatrix}x\\0\end{pmatrix}$

$$||\mathbf{A}-\mathbf{P}|| = ||\mathbf{B}-\mathbf{P}|| \tag{1}$$

$$||\mathbf{A}-\mathbf{P}|| = \sqrt{(\mathbf{A}-\mathbf{P})^\top(\mathbf{A}-\mathbf{P})}$$

$$||\mathbf{A}-\mathbf{P}|| = \sqrt{\begin{pmatrix}7-x\\6\end{pmatrix}\begin{pmatrix}7-x & 6\end{pmatrix}}$$

$$||\mathbf{A}-\mathbf{P}|| = (7-x)^2+36$$

$$||\mathbf{B}-\mathbf{P}|| = \sqrt{(\mathbf{B}-\mathbf{P})^\top(\mathbf{B}-\mathbf{P})}$$

$$||\mathbf{B}-\mathbf{P}|| = \sqrt{\begin{pmatrix}3-x\\4\end{pmatrix}\begin{pmatrix}3-x & 4\end{pmatrix}}$$

$$||\mathbf{B}-\mathbf{P}|| = (3-x)^2+16$$

5. From equation 1

$$(7-x)^2+36 = (3-x)^2+16$$
$$(7-x)^2+20 = (3-x)^2$$
$$49+x^2-14x+20 = 9+x^2-6x$$
$$60 = 8x$$
$$x = 60/8$$
$$x = 7.5$$