1.9.2

EE24BTECH11021 - Eshan Ray

Question:

The point on the X axis which is equidistant from $(-4, 0)$ and $(10, 0)$ is...

Solution: Let $\mathbf{A} = \begin{pmatrix} a \\ 0 \end{pmatrix}$ be the point on X axis equidistant from $\mathbf{B} = \begin{pmatrix} -4 \\ 0 \end{pmatrix}$ and $\mathbf{C} = \begin{pmatrix} 10 \\ 0 \end{pmatrix}$.

$$(\|\mathbf{B} - \mathbf{A}\|)^2 = (\|\mathbf{C} - \mathbf{A}\|)^2 \tag{1}$$

$$\implies \mathbf{B}^2 + \mathbf{A}^2 - 2\mathbf{A}\mathbf{B}^\top = \mathbf{C}^2 + \mathbf{A}^2 - 2\mathbf{A}\mathbf{C}^\top \tag{2}$$

$$\implies \mathbf{A}\left(\mathbf{C}^\top - \mathbf{B}^\top\right) = \frac{\mathbf{C}^2 - \mathbf{B}^2}{2} \tag{3}$$

$$\implies \begin{pmatrix} a \\ 0 \end{pmatrix}\begin{pmatrix} 14 & 0 \end{pmatrix} = \frac{84}{2} \tag{4}$$

$$\implies 14a = 42 \tag{5}$$

$$\implies a = 3 \tag{6}$$

$$\therefore \mathbf{A} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \tag{7}$$

The point equidistant from $(-4, 0)$ and $(10, 0)$ is $(3, 0)$.

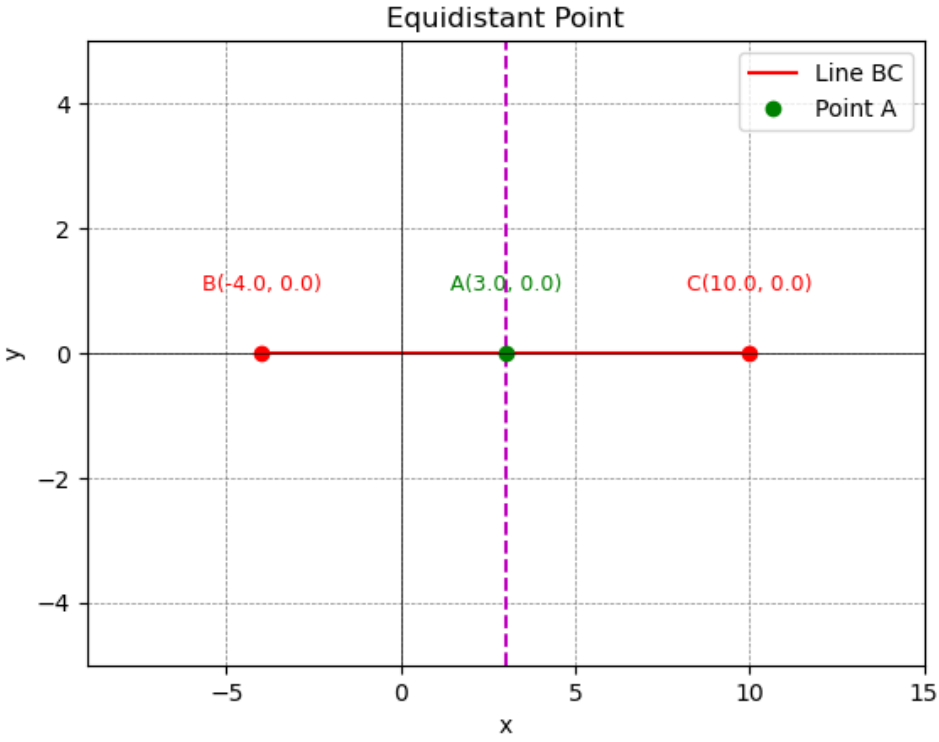
Equidistant Point
Line BC
Point A
B(-4.0, 0.0)
A(3.0, 0.0)
C(10.0, 0.0)
y
x
4
2
0
−2
−4
−5
0
5
10
15

Fig. 0