SM5083
Assignment Number 01

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SM21MTECH11002

1. Chapter II Ex-14 Q. II

1.1. Problem Statement:Find the in-centres of the triangles whose vertices are as follows, (5,3), (5,-1), (-7,-6)

Solution: let

$$\mathbf{A} = \begin{pmatrix}5\\3\end{pmatrix}, \mathbf{B} = \begin{pmatrix}5\\-1\end{pmatrix}, \mathbf{C} = \begin{pmatrix}-7\\-6\end{pmatrix} \tag{1.1.1}$$

$$B - A = \begin{pmatrix}0\\-4\end{pmatrix} \tag{1.1.2}$$

$$\|\mathbf{B}-\mathbf{A}\|^2 = (\mathbf{B}-\mathbf{A})^\top(\mathbf{B}-\mathbf{A}) = \begin{pmatrix}0 & -4\end{pmatrix}\begin{pmatrix}0\\-4\end{pmatrix} \tag{1.1.3}$$

$$\|\mathbf{B}-\mathbf{A}\| = \sqrt{(0^2+(-4)^2)} \tag{1.1.4}$$

$$\|\mathbf{B}-\mathbf{A}\| = 4 \tag{1.1.5}$$

similarly,

$$\|\mathbf{C}-\mathbf{B}\| = 13 \tag{1.1.6}$$

$$\|\mathbf{A}-\mathbf{C}\| = 15 \tag{1.1.7}$$

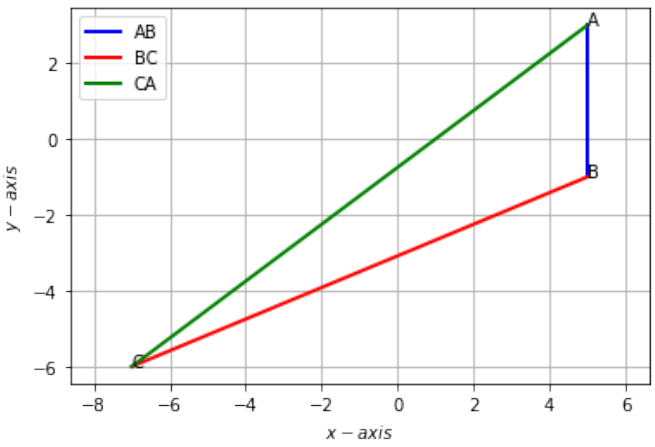

Fig. 1.1. A Triangle for given points

Now find in-centre of a triangle,

$$In-centre = \left(\frac{\|\mathbf{B}-\mathbf{A}\| * C + \|\mathbf{C}-\mathbf{B}\| * A + \|\mathbf{A}-\mathbf{C}\| * B}{\|\mathbf{B}-\mathbf{A}\| + \|\mathbf{C}-\mathbf{B}\| + \|\mathbf{A}-\mathbf{C}\|}\right)$$

$$= (3.5, 0)$$