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

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

$$B - A = \begin{pmatrix} 0 \\ -4 \end{pmatrix} \qquad (1.1.2)$$

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

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

$$\|\mathbf{B} - \mathbf{A}\| = 4 \qquad (1.1.5)$$

similarly,

$$\|\mathbf{C} - \mathbf{B}\| = 13 \qquad (1.1.6)$$
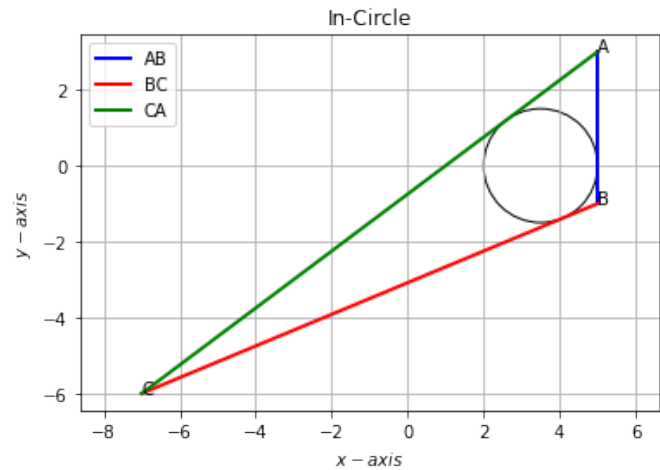
$$\|\mathbf{A} - \mathbf{C}\| = 15 \qquad (1.1.7)$$

Now find in-centre of a triangle,

Fig. 1.1. A Triangle for given points

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

$$= (3.5, 0)$$