

# SM5083

## Assignment Number 01

Akash S. Kamble  
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

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

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

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

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

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

similarly,

$$\|\mathbf{C} - \mathbf{B}\| = 13 \quad (1.1.6)$$

$$\|\mathbf{A} - \mathbf{C}\| = 15 \quad (1.1.7)$$

Now find in-centre of a triangle,

$$\begin{aligned} \text{In-centre} &= \left( \frac{\|\mathbf{B} - \mathbf{A}\| \mathbf{C} + \|\mathbf{C} - \mathbf{B}\| \mathbf{A} + \|\mathbf{A} - \mathbf{C}\| \mathbf{B}}{\|\mathbf{B} - \mathbf{A}\| + \|\mathbf{C} - \mathbf{B}\| + \|\mathbf{A} - \mathbf{C}\|} \right) \\ &= (3.5, 0) \end{aligned}$$

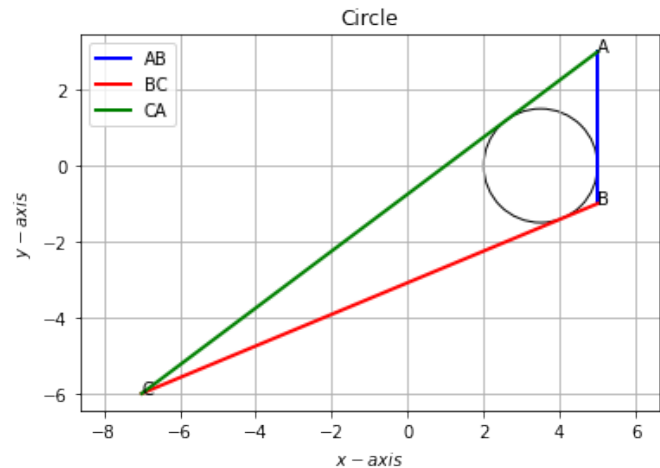


Fig. 1.1. A Triangle for given points