ASSIGNMENT

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Question : Verify that

$$OA = OB = OC \tag{1}$$

Solution: From the previous results,

$$\mathbf{O} = \begin{pmatrix} \frac{-53}{12} \\ \frac{5}{12} \end{pmatrix} \tag{2}$$

Calculating the OA, OB and OC:-

$$OA = \|\mathbf{A} - \mathbf{O}\| = \sqrt{(\mathbf{A} - \mathbf{O})^\top (\mathbf{A} - \mathbf{O})} \tag{3}$$

$$OB = \|\mathbf{B} - \mathbf{O}\| = \sqrt{(\mathbf{B} - \mathbf{O})^\top (\mathbf{B} - \mathbf{O})} \tag{4}$$

$$OC = \|\mathbf{C} - \mathbf{O}\| = \sqrt{(\mathbf{C} - \mathbf{O})^\top (\mathbf{C} - \mathbf{O})} \tag{5}$$

1) Solving for OA:-

$$OA = \sqrt{\begin{pmatrix} 1 + \frac{53}{12} \\ -1 - \frac{5}{12} \end{pmatrix} \begin{pmatrix} 1 + \frac{53}{12} & -1 - \frac{5}{12} \end{pmatrix}} \tag{6}$$

$$= \sqrt{\begin{pmatrix} \frac{65}{12} \\ \frac{-17}{12} \end{pmatrix} \begin{pmatrix} \frac{65}{12} & \frac{-17}{12} \end{pmatrix}} \tag{7}$$

$$= \sqrt{\left(\frac{65}{12}\right)^2 + \left(\frac{17}{12}\right)^2} \tag{8}$$

$$= 5.5988 \tag{9}$$

2) Solving for OB:-

$$OB = \sqrt{\begin{pmatrix} -4 + \frac{53}{12} \\ 6 - \frac{5}{12} \end{pmatrix} \begin{pmatrix} -4 + \frac{53}{12} & 6 - \frac{5}{12} \end{pmatrix}} \tag{10}$$

$$= \sqrt{\begin{pmatrix} \frac{5}{12} \\ \frac{67}{12} \end{pmatrix} \begin{pmatrix} \frac{5}{12} & \frac{67}{12} \end{pmatrix}} \tag{11}$$

$$= \sqrt{\left(\frac{5}{12}\right)^2 + \left(\frac{67}{12}\right)^2} \tag{12}$$

$$= 5.5988 \tag{13}$$

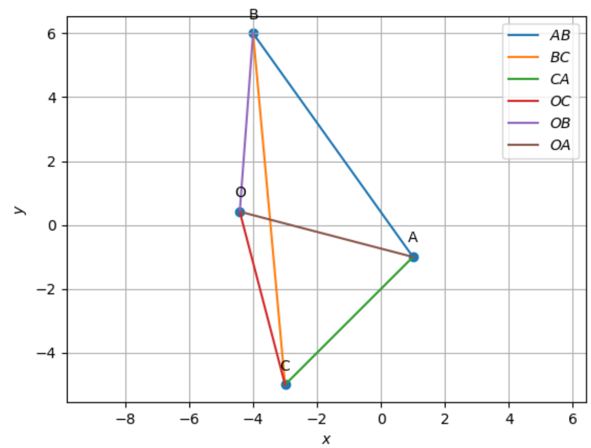

Fig. 2. Triangle generated using python

3) Solving for OC:-

$$OC = \sqrt{\begin{pmatrix} -3 + \frac{53}{12} \\ -5 - \frac{5}{12} \end{pmatrix} \begin{pmatrix} -3 + \frac{53}{12} & -5 - \frac{5}{12} \end{pmatrix}} \tag{14}$$

$$= \sqrt{\begin{pmatrix} \frac{17}{12} \\ \frac{-65}{12} \end{pmatrix} \begin{pmatrix} \frac{17}{12} & \frac{-65}{12} \end{pmatrix}} \tag{15}$$

$$= \sqrt{\left(\frac{17}{12}\right)^2 + \left(\frac{65}{12}\right)^2} \tag{16}$$

$$= 5.5988 \tag{17}$$

Hence, from above,it can be concluded that,

$$OA = OB = OC \tag{18}$$

Hence verified.