ASSIGNMENT

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Question : Verify that

$$OA = OB = OC \qquad (1)$$

Solution: From the previous results,

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

Calculating the OA, OB and OC:-

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

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

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

1) Solving for OA:-

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

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

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

$$= 5.5988 \qquad (9)$$

2) Solving for OB:-

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

$$= \sqrt{\begin{pmatrix} \frac{5}{12} \\ \frac{67}{12} \end{pmatrix}\begin{pmatrix} \frac{5}{12} & \frac{67}{12} \end{pmatrix}} \qquad (11)$$

$$= \sqrt{\left(\frac{5}{12}\right)^2 + \left(\frac{67}{12}\right)^2} \qquad (12)$$
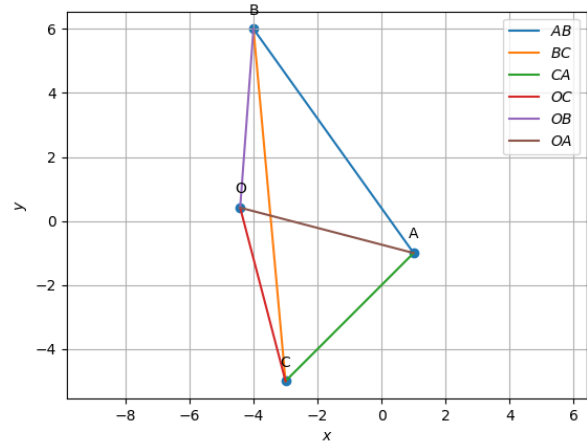
$$= 5.5988 \qquad (13)$$

Fig. 2. Triangle generated using python

3) Solving for OC:-

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

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

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

$$= 5.5988 \qquad (17)$$

Hence, from (9), (13) and (17),it can be concluded that,

$$OA = OB = OC \qquad (18)$$

Hence verified.