1.4.4 Verify that $\mathbf{OA} = \mathbf{OB} = \mathbf{OC}$

Solution:

We know that

$$\mathbf{O} = \frac{1}{12}\begin{pmatrix}-53\\5\end{pmatrix} \tag{1}$$

$$\mathbf{OA} = \mathbf{A} - \mathbf{O} \tag{2}$$

$$= \begin{pmatrix}1\\-1\end{pmatrix} - \frac{1}{12}\begin{pmatrix}-53\\5\end{pmatrix} \tag{3}$$

$$= \frac{1}{12}\begin{pmatrix}65\\-17\end{pmatrix} \tag{4}$$

$$\|\mathbf{OA}\| = \left\|\frac{1}{12}\begin{pmatrix}65\\-17\end{pmatrix}\right\| \tag{5}$$

$$= \frac{1}{12}\sqrt{4514} \tag{6}$$

$$\mathbf{OB} = \mathbf{B} - \mathbf{O} \tag{7}$$

$$= \begin{pmatrix}-4\\6\end{pmatrix} - \frac{1}{12}\begin{pmatrix}-53\\5\end{pmatrix} \tag{8}$$

$$= \frac{1}{12}\begin{pmatrix}5\\67\end{pmatrix} \tag{9}$$

$$\|\mathbf{OB}\| = \left\|\frac{1}{12}\begin{pmatrix}5\\67\end{pmatrix}\right\| \tag{10}$$

$$= \frac{1}{12}\sqrt{4514} \tag{11}$$

$$\mathbf{OC} = \mathbf{C} - \mathbf{O} \tag{12}$$

$$= \begin{pmatrix}-3\\-5\end{pmatrix} - \frac{1}{12}\begin{pmatrix}-53\\5\end{pmatrix} \tag{13}$$

$$= \frac{1}{12}\begin{pmatrix}17\\-65\end{pmatrix} \tag{14}$$

$$\|\mathbf{OC}\| = \left\|\frac{1}{12}\begin{pmatrix}17\\-65\end{pmatrix}\right\| \tag{15}$$

$$= \frac{1}{12}\sqrt{4514} \tag{16}$$

$$\therefore \mathbf{OA} = \mathbf{OB} = \mathbf{OC} \tag{17}$$