Question 2.6.37:

The vector from origin to the points A and B are

$$\mathbf{a} = 2\hat{i} - 3\hat{j} + 2\hat{k} \quad \text{and} \quad \mathbf{b} = 2\hat{i} + 3\hat{j} + \hat{k}, \tag{1}$$

respectively, then the area of $\triangle OAB$ is _____.

Solution:

Given

$$\mathbf{a} = \begin{pmatrix} 2 \\ -3 \\ 2 \end{pmatrix}, \quad \mathbf{b} = \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix}, \quad \mathbf{B} - \mathbf{A} = \mathbf{b} - \mathbf{a}. \tag{2}$$

$$\text{Area}(\triangle OAB) = \frac{1}{2}\left\|\mathbf{a} \times \mathbf{b}\right\| \tag{3}$$

$$= \frac{1}{2}\left\|-9\,\hat{\imath} + 2\,\hat{\jmath} + 12\,\hat{k}\right\| = \frac{1}{2}\sqrt{(-9)^2 + 2^2 + 12^2} = \frac{\sqrt{229}}{2} \tag{4}$$

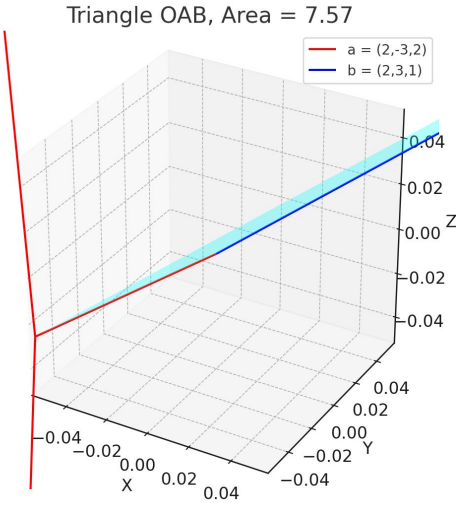
Triangle OAB, Area = 7.57
a = (2,-3,2)
b = (2,3,1)
0.04
0.02
0.00
Z
−0.02
−0.04
0.04
0.02
0.00
Y
−0.02
−0.04
−0.04
−0.02
0.00
0.02
0.04
X

Fig. 1