2.6.34

AI25BTECH110023 - Pratik R

Question: Find the area of region bounded by the triangle whose vertices are $(-1, 1)$,$(0, 5)$ and $(3, 2)$.

Solution:

Given: $A(-1, 1)$, $B(0, 5)$, $C(3, 2)$.

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}, \qquad \mathbf{C} - \mathbf{A} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}.$$

$$\|(\mathbf{B} - \mathbf{A}) \times (\mathbf{C} - \mathbf{A})\| = \left\| \begin{pmatrix} |\mathbf{A_{11}} & \mathbf{B_{23}}| \\ |\mathbf{A_{31}} & \mathbf{B_{31}}| \\ |\mathbf{A_{12}} & \mathbf{B_{12}}| \end{pmatrix} \right\| = 15$$

$$\text{Area} = \frac{1}{2} \|(\mathbf{B} - \mathbf{A}) \times (\mathbf{C} - \mathbf{A})\| = 7.5$$

$$\boxed{\textit{Area of Triangle } ABC \;=\; 7.5 \textit{ sq.units}} \tag{0.1}$$

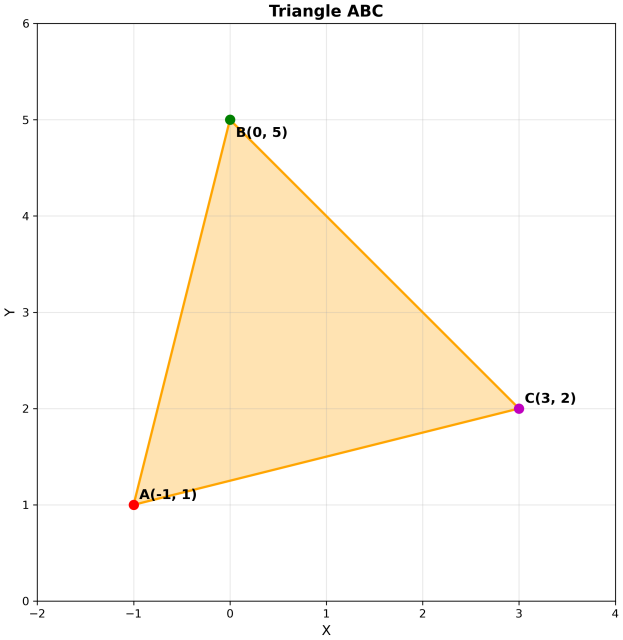

Fig. 0.1: Vector Representation