2.7.27

EE25BTECH11015 - Bhoomika V

Question :-

Find the area of the triangle ABC whose vertices are $\mathbf{A}(2,5)$, $\mathbf{B}(4,7)$, $\mathbf{C}(6,2)$.

Solution:

Point	Vector
A	$\begin{bmatrix}2\\5\\0\end{bmatrix}$
B	$\begin{bmatrix}4\\7\\0\end{bmatrix}$
C	$\begin{bmatrix}6\\2\\0\end{bmatrix}$

TABLE 0: Vectors

$$(\mathbf{A}-\mathbf{B}) = \begin{bmatrix}2\\5\\0\end{bmatrix} - \begin{bmatrix}4\\7\\0\end{bmatrix} = \begin{bmatrix}-2\\-2\\0\end{bmatrix}, \tag{0.1}$$

$$(\mathbf{A}-\mathbf{C}) = \begin{bmatrix}2\\5\\0\end{bmatrix} - \begin{bmatrix}6\\2\\0\end{bmatrix} = \begin{bmatrix}-4\\3\\0\end{bmatrix}. \tag{0.2}$$

Using (0.1) and (0.2) The magnitude of the cross product is

$$\left\|(\mathbf{A}-\mathbf{B})\times(\mathbf{A}-\mathbf{C})\right\| = \sqrt{0^2+0^2+(-14)^2} = 14. \tag{0.3}$$

Therefore the area of triangle ABC is

$$\text{ar}(\triangle ABC) = \frac{1}{2}\left\|(\mathbf{A}-\mathbf{B})\times(\mathbf{A}-\mathbf{C})\right\| = \frac{1}{2}\times 14 = 7. \tag{0.4}$$

Therefore $\text{ar}(\triangle ABC) = 7$.

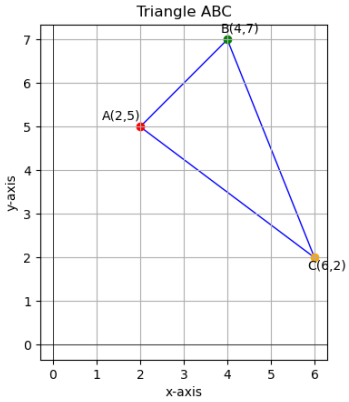

Fig. 0.1