

# Assignment 7

V.Nagajyothi

Download all python codes from

<https://github.com/nagajyothi/ASSIGNMENT7/Assignment7.py>

and latex-tikz codes from

<https://github.com/nagajyothi/ASSIGNMENT7/main.tex>

$$\mathbf{a} \times \mathbf{b} = \begin{pmatrix} 0 & -a_3 & a_2 \\ a_3 & 0 & -a_1 \\ -a_2 & a_1 & 0 \end{pmatrix} \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix} \quad (2.0.6)$$

$$= \begin{pmatrix} 0 & -1 & 1 \\ 1 & 0 & -1 \\ -1 & 1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \quad (2.0.7)$$

$$= \begin{pmatrix} 1 \\ -2 \\ 1 \end{pmatrix} \quad (2.0.8)$$

PLOT OF GIVEN -

## 1 QUESTION No.VECTORS-2.7

Find the area of triangle having the points  $\mathbf{A} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ ,  $\mathbf{B} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ , and  $\mathbf{C} = \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix}$  as it's vertices

## 2 SOLUTION

The area of a triangle using the vector product is obtained as

$$\frac{1}{2} \left\| (\mathbf{a} = \mathbf{B} - \mathbf{A}) \times (\mathbf{b} = \mathbf{C} - \mathbf{A}) \right\| \quad (2.0.1)$$

$$= \frac{1}{2} \left\| \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} - \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \times \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix} - \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \right\| \quad (2.0.2)$$

$$= \frac{1}{2} \left\| \begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix} \times \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix} \right\| \quad (2.0.3)$$

$$= \frac{\sqrt{13}}{2} \quad (2.0.4)$$

For any two vectors,

$$\mathbf{a} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \quad (2.0.5)$$

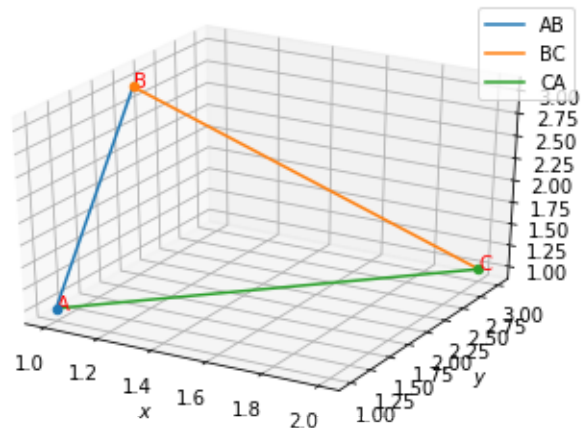


Fig. 0: the area of triangle