

Assignment 5

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Download all python codes from

[https://github.com/mirhasidheek7213/
InternshipIITH/tree/main/Assignment-5/Codes](https://github.com/mirhasidheek7213/InternshipIITH/tree/main/Assignment-5/Codes)

and latex-tikz codes from

[https://github.com/mirhasidheek7213/
InternshipIITH/blob/main/Assignment-5/
Assignment5.tex](https://github.com/mirhasidheek7213/InternshipIITH/blob/main/Assignment-5/Assignment5.tex)

$$\begin{vmatrix} 1 & 1 & 1 \\ 2 & 5 & k \\ -6 & 4 & 4 \end{vmatrix} \xrightarrow[C_2 - C_3 \rightarrow C_2]{C_1 - C_3 \rightarrow C_1} \quad (2.0.6)$$

$$\begin{vmatrix} 0 & 0 & 1 \\ 2 - k & 5 - k & k \\ 10 & 0 & 4 \end{vmatrix} \quad (2.0.7)$$

$$\text{Determinant} = 10(5 - k) \quad (2.0.8)$$

Since area of triangle is half of the determinant of area matrix,

$$\frac{1}{2} 10(5 - k) = 35 \quad (2.0.9)$$

$$\Rightarrow 50 - 10k = 70 \quad (2.0.10)$$

$$\Rightarrow k = -2 \quad (2.0.11)$$

1 QUESTION NO. 1.77 - MATRICES

If the area of the triangle is 35 sq.units with vertices $(2 \ -6), (5 \ 4), (k \ 4)$, then k is,

2 SOLUTION

Given the vertices of triangle,

$$\mathbf{A} = \begin{pmatrix} 2 \\ -6 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} k \\ 4 \end{pmatrix} \quad (2.0.1)$$

Area of the triangle = 35 sq.units

Area matrix is,

$$\begin{pmatrix} 1 & 1 & 1 \\ \mathbf{A} & \mathbf{B} & \mathbf{C} \end{pmatrix} \quad (2.0.2)$$

$$= \begin{pmatrix} 1 & 1 & 1 \\ 2 & 5 & k \\ -6 & 4 & 4 \end{pmatrix} \quad (2.0.3)$$

Area of Triangle = $\frac{1}{2} \times |\text{AreaMatrix}|$

$$\Rightarrow \frac{1}{2} \times \begin{vmatrix} 1 & 1 & 1 \\ \mathbf{A} & \mathbf{B} & \mathbf{C} \end{vmatrix} \quad (2.0.4)$$

$$= \frac{1}{2} \times \begin{vmatrix} 1 & 1 & 1 \\ 2 & 5 & k \\ -6 & 4 & 4 \end{vmatrix} \quad (2.0.5)$$

By using column operation,

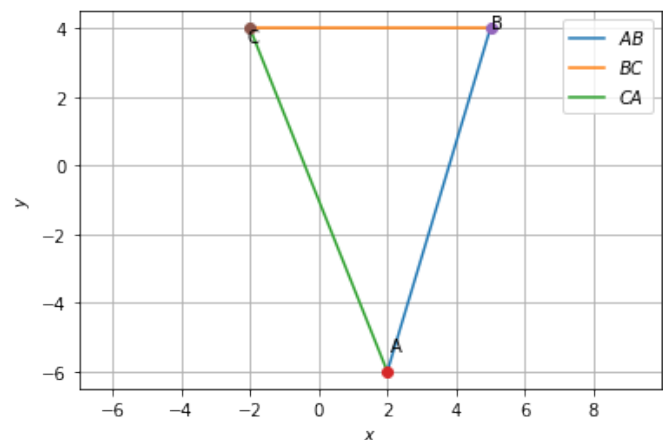


Fig. 0: Plot of the triangle