Assignment 1

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Download all python codes from

https://github.com/KeshavRoy/area_of_triangle

and latex-tikz codes from

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1 Problem

(1.56) Find area of the triangle with vertices at the point given in each of the following :
(i) (2 7) , (1 1) , (10 8)

2 Solution

vertices in vector form

$$\mathbf{A} = \begin{pmatrix}2\\7\end{pmatrix}, \mathbf{B} = \begin{pmatrix}1\\1\end{pmatrix}, \mathbf{C} = \begin{pmatrix}10\\8\end{pmatrix} \tag{2.0.1}$$

Area of triangle $\triangle ABC$ is given by

$$\Delta = \frac{1}{2} \times \begin{vmatrix} 1 & 1 & 1 \\ \mathbf{A} & \mathbf{B} & \mathbf{C} \end{vmatrix} \tag{2.0.2}$$

$$\begin{vmatrix} 1 & 1 & 1 \\ 2 & 1 & 10 \\ 7 & 1 & 8 \end{vmatrix} \tag{2.0.3}$$

$$\xleftrightarrow{C_2 \leftarrow C_2 - C_1} \begin{vmatrix} 1 & 0 & 1 \\ 2 & -1 & 10 \\ 7 & -6 & 8 \end{vmatrix} \tag{2.0.4}$$

$$\xleftrightarrow{C_3 \leftarrow c_3 - C_1} \begin{vmatrix} 1 & 0 & 0 \\ 2 & -1 & 8 \\ 7 & -6 & 1 \end{vmatrix} \tag{2.0.5}$$

$$\xleftrightarrow{R_2 \leftarrow R_2 - 2R_1} \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & -8 \\ 7 & -6 & 1 \end{vmatrix} \tag{2.0.6}$$

$$\xleftrightarrow{R_3 \leftarrow R_3 - 7R_1} \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & -8 \\ 0 & 6 & -1 \end{vmatrix} \tag{2.0.7}$$

$$= 1 \begin{vmatrix} 1 & -8 \\ 6 & -1 \end{vmatrix} \tag{2.0.8}$$

$$= 1(-1 + 48) \tag{2.0.9}$$

$$= 47 \tag{2.0.10}$$

$$\Delta = \frac{1}{2} \times (47) \tag{2.0.11}$$

$$\Delta = 23.5 \tag{2.0.12}$$

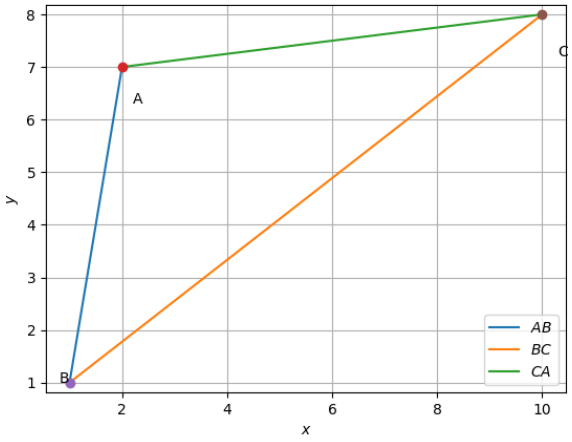

Fig. 0: triangle