Assignment 1

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Download all python codes from

https://github.com/AnilMondedla/Python

and latex-tikz codes from

https://github.com/AnilMondedla/Python

1 Problem

(1.56) Find area of the triangle with vertices at the point given in each of the following :
(i) (1 0) , (6 0) , (4 3)

2 Solution

vertices in vector form

$$\mathbf{A} = \begin{pmatrix}1\\0\end{pmatrix}, \mathbf{B} = \begin{pmatrix}6\\0\end{pmatrix}, \mathbf{C} = \begin{pmatrix}4\\3\end{pmatrix} \tag{2.0.1}$$

Here,
Draw a perpendicular line from C to AB.

$$\mathbf{P} = \begin{pmatrix}4\\0\end{pmatrix} \tag{2.0.2}$$

Then Line CP becomes the height of the triangle
The direction vectors of AB and PC are

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix}5\\0\end{pmatrix} \tag{2.0.3}$$

$$\mathbf{C} - \mathbf{P} = \begin{pmatrix}0\\3\end{pmatrix} \tag{2.0.4}$$

$$\mathbf{M} = \begin{pmatrix}\mathbf{B} - \mathbf{A} & \mathbf{C} - \mathbf{P}\end{pmatrix}^T \tag{2.0.5}$$

$$\mathrm{M} = \begin{bmatrix}5 & 0\\0 & 3\end{bmatrix}$$

The area of $\triangle ABC$ is obtained in terms of the magnitude of the determinant of the matrix $\mathbf{M}$ in

$$\frac{1}{2}\left|\mathbf{M}\right| \tag{2.0.6}$$

$$\Delta = \frac{1}{2} \times \begin{vmatrix}5 & 0\\0 & 3\end{vmatrix} \tag{2.0.7}$$

$$\Delta = 7.5$$

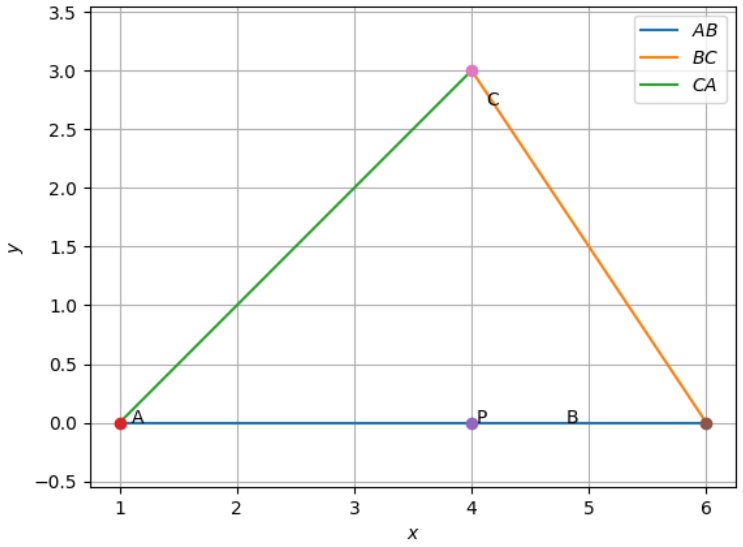

Fig. 0: triangle.