Assignment 3

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Download all python codes from

https://github.com/AnilMondedla/Python/Assignment_3

and latex-tikz codes from

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1 Problem

2.5. Check whether

$$\begin{pmatrix}5\\-2\end{pmatrix},\begin{pmatrix}6\\4\end{pmatrix},\begin{pmatrix}7\\-2\end{pmatrix}$$

are the vertices of an isosceles triangle.

2 Solution

Given vertices are

$$\mathbf{A}=\begin{pmatrix}5\\-2\end{pmatrix},\mathbf{B}=\begin{pmatrix}6\\4\end{pmatrix},\mathbf{C}=\begin{pmatrix}7\\-2\end{pmatrix} \tag{2.0.1}$$

In an isosceles triangle length of two sides will be equal

The direction vectors of AB,BC and CA are

$$\mathbf{B}-\mathbf{A}=\begin{pmatrix}1\\6\end{pmatrix} \tag{2.0.2}$$

$$\mathbf{C}-\mathbf{B}=\begin{pmatrix}1\\-6\end{pmatrix} \tag{2.0.3}$$

$$\mathbf{A}-\mathbf{C}=\begin{pmatrix}-2\\0\end{pmatrix} \tag{2.0.4}$$

$$\|\mathbf{B}-\mathbf{A}\|^2=(\mathbf{B}-\mathbf{A})^T(\mathbf{B}-\mathbf{A}) \tag{2.0.5}$$

$$=\begin{pmatrix}1&6\end{pmatrix}\begin{pmatrix}1\\6\end{pmatrix} \tag{2.0.6}$$

$$=37 \tag{2.0.7}$$

$$\|\mathbf{C}-\mathbf{B}\|^2=(\mathbf{C}-\mathbf{B})^T(\mathbf{C}-\mathbf{B}) \tag{2.0.8}$$

$$=\begin{pmatrix}1&-6\end{pmatrix}\begin{pmatrix}1\\-6\end{pmatrix} \tag{2.0.9}$$

$$=37 \tag{2.0.10}$$

$$\|\mathbf{A}-\mathbf{C}\|^2=(\mathbf{A}-\mathbf{C})^T(\mathbf{A}-\mathbf{C}) \tag{2.0.11}$$

$$=\begin{pmatrix}-2&0\end{pmatrix}\begin{pmatrix}-2\\0\end{pmatrix} \tag{2.0.12}$$

$$=4 \tag{2.0.13}$$

Sides AB and BC are equal. Hence the given points are the vertices of isosceles triangle.

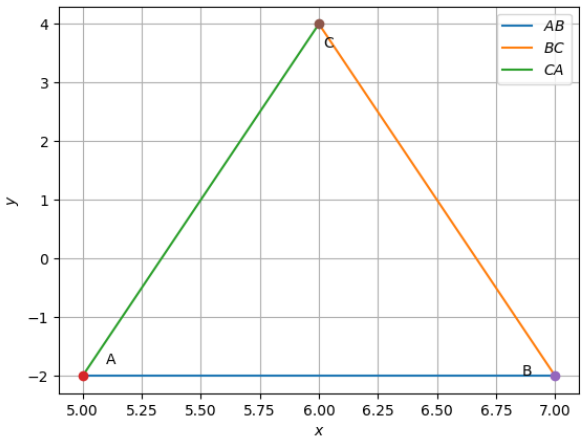

Fig. 0: triangle