

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 VECTORS Q:2.5

Question : 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

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

In an isosceles triangle length of two sides will be equal

The direction vectors of AB, BC and CA are

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 1 \\ 6 \end{pmatrix} \quad (2.0.2)$$

$$\mathbf{C} - \mathbf{B} = \begin{pmatrix} 1 \\ -6 \end{pmatrix} \quad (2.0.3)$$

$$\mathbf{A} - \mathbf{C} = \begin{pmatrix} -2 \\ 0 \end{pmatrix} \quad (2.0.4)$$

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

$$= \begin{pmatrix} 1 & 6 \end{pmatrix} \begin{pmatrix} 1 \\ 6 \end{pmatrix} \quad (2.0.6)$$

$$= 37 \quad (2.0.7)$$

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

$$= \begin{pmatrix} 1 & -6 \end{pmatrix} \begin{pmatrix} 1 \\ -6 \end{pmatrix} \quad (2.0.9)$$

$$= 37 \quad (2.0.10)$$

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

$$= \begin{pmatrix} -2 & 0 \end{pmatrix} \begin{pmatrix} -2 \\ 0 \end{pmatrix} \quad (2.0.12)$$

$$= 4 \quad (2.0.13)$$

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

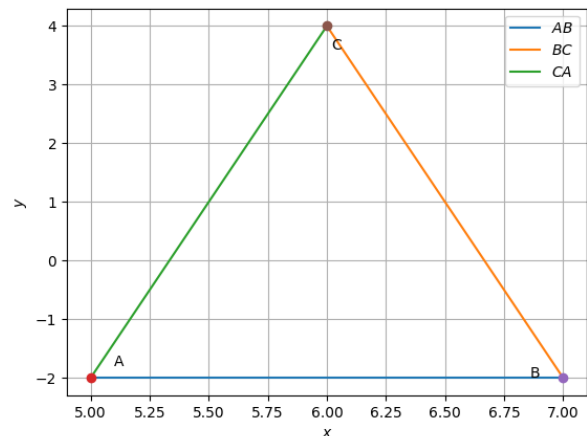


Fig. 0: triangle