Assignment 5

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Find Python Codes from below link

https://raw.githubusercontent.com/jaisai1337/IITH/main/SU/Assignment5/code.py

and Latex codes from below link

https://raw.githubusercontent.com/jaisai1337/IITH/main/SU/Assignment5/main.tex

1 Examples 1

1.1 Question 1

Prove(by shewing that the area of the triangle formed by them is zero) that the following sets of three points are in a straight line (1,4), (3,-2), (-3,16).

1.2 Solution

$$\frac{1}{2}\left|\left(A-B\right)\left(A-C\right)\right| \tag{1.2.1}$$

Let $\mathbf{A}=\begin{pmatrix}1\\4\end{pmatrix}, \mathbf{B}=\begin{pmatrix}3\\-2\end{pmatrix}, \mathbf{C}=\begin{pmatrix}-3\\16\end{pmatrix}$

$$\mathbf{A}-\mathbf{B}=\begin{pmatrix}1\\4\end{pmatrix}-\begin{pmatrix}3\\-2\end{pmatrix} \tag{1.2.2}$$

$$=\begin{pmatrix}-2\\6\end{pmatrix} \tag{1.2.3}$$

$$\mathbf{A}-\mathbf{C}=\begin{pmatrix}1\\4\end{pmatrix}-\begin{pmatrix}-3\\16\end{pmatrix} \tag{1.2.4}$$

$$=\begin{pmatrix}4\\-12\end{pmatrix} \tag{1.2.5}$$

From (1.2.1)

Area of the triangle

$$=\frac{1}{2}\begin{vmatrix}-2 & 4\\6 & -12\end{vmatrix} \tag{1.2.6}$$

$$=\frac{1}{2}\left[\left(-2\times-12\right)-\left(6\times4\right)\right] \tag{1.2.7}$$

$$=\frac{1}{2}\left(24-24\right) \tag{1.2.8}$$

$$=\frac{1}{2}\left(0\right) \tag{1.2.9}$$

$$=0$$

Since the area is 0 the given points form a straight line.

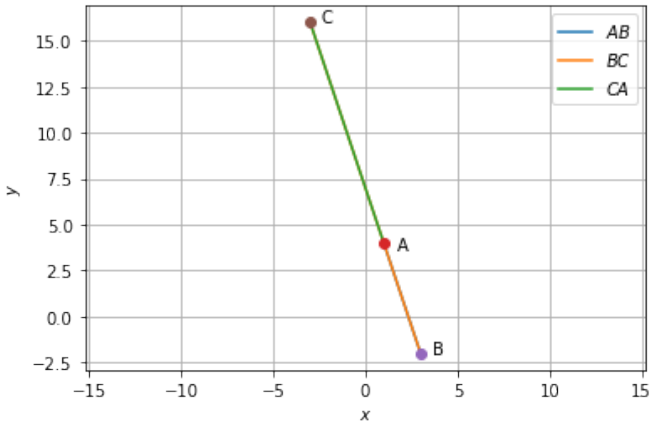

Fig. 0