Assignment 5

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Find Python Codes from below link

https://github.com/Hruday-Beeravelli/INTERNSHIP-IITH-1/blob/main/Assignment4/A4.py

and Latex codes from below link

https://github.com/Hruday-Beeravelli/INTERNSHIP-IITH-1/blob/main/Assignment4/A4.tex

1 Examples 2

1.1 Question 11

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 $(-\frac{1}{2}, 3), (-5, 6)$ and $(-8, 8)$

1.2 Solution

Rank of matrix method:
If rank of matrix is not full matrix after row reduction, then points are said to be collinear

$$\begin{pmatrix} \mathbf{A}-\mathbf{B} & \mathbf{A}-\mathbf{C} \end{pmatrix}^{\top} \tag{1.2.1}$$

Let $\mathbf{A} = \begin{pmatrix} -\frac{1}{2} \\ 3 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -5 \\ 6 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} -8 \\ 8 \end{pmatrix}$

$$\mathbf{A}-\mathbf{B} = \begin{pmatrix} -\frac{1}{2} \\ 3 \end{pmatrix} - \begin{pmatrix} -5 \\ 6 \end{pmatrix} \tag{1.2.2}$$

$$= \begin{pmatrix} \frac{9}{2} \\ -3 \end{pmatrix} \tag{1.2.3}$$

$$\mathbf{A}-\mathbf{C} = \begin{pmatrix} -\frac{1}{2} \\ 3 \end{pmatrix} - \begin{pmatrix} -8 \\ 8 \end{pmatrix} \tag{1.2.4}$$

$$= \begin{pmatrix} \frac{15}{2} \\ -5 \end{pmatrix} \tag{1.2.5}$$

From (1.2.1)
Let

$$\mathbf{M} = \begin{pmatrix} \frac{9}{2} & \frac{15}{2} \\ -3 & -5 \end{pmatrix}^{\top} \tag{1.2.6}$$

$$= \begin{pmatrix} \frac{9}{2} & -3 \\ \frac{15}{2} & -5 \end{pmatrix} \tag{1.2.7}$$

$$\tag{1.2.8}$$

Row Reduction $R_1 \longleftarrow R_1 - 0.6 \times R_2$

$$\tag{1.2.9}$$

$$= \begin{pmatrix} 0 & 0 \\ \frac{15}{2} & -5 \end{pmatrix} \tag{1.2.10}$$

$$\tag{1.2.11}$$

Since the rank of matrix $\mathbf{M}$ is which is not full matrix,
therefore the given points are collinear.

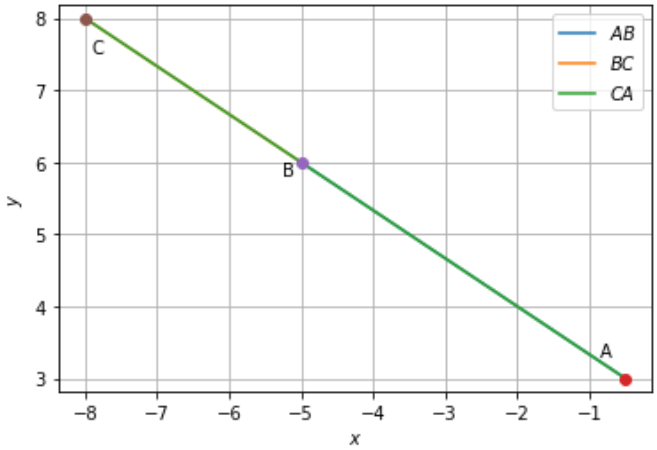

Fig. 0