# 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

$$\frac{1}{2}\left|\begin{pmatrix}\mathbf{A}-\mathbf{B}\end{pmatrix} \quad \begin{pmatrix}\mathbf{A}-\mathbf{C}\end{pmatrix}\right| \tag{1.2.1}$$

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)

Area of the triangle

$$= \frac{1}{2}\begin{vmatrix}\frac{9}{2} & \frac{15}{2}\\-3 & -5\end{vmatrix} \tag{1.2.6}$$

$$= \frac{1}{2}\left[\left(\tfrac{9}{2}\times -5\right) - \left(\tfrac{15}{2}\times -3\right)\right] \tag{1.2.7}$$

$$= \frac{1}{2}\left(-\tfrac{45}{2} + \tfrac{45}{2}\right) \tag{1.2.8}$$

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

$$= 0$$

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

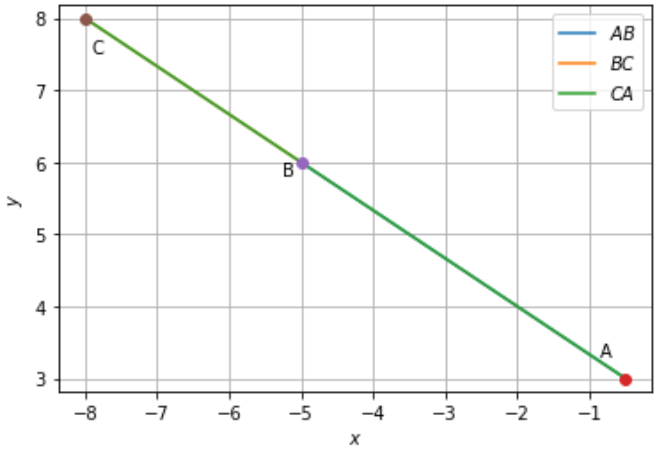


Fig. 0