LINES ASSIGNMENT

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FWC22097 - IITH Future Wireless Communication (FWC)

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1 Problem

If a vertex of a triangle is (1,1) and the midpoints of two sides through this vertex are (-1,2) and (3,2). Then find the centroid of the triangle.

2 Solution

Let A,B and C be the vertices of the triangle. And E , F are midpoints of two sides through the vertex A. Given $\mathbf{A} = (1,1), \mathbf{E} = (-1,2), \mathbf{F} = (3,2)$

$$\mathbf{A} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\mathbf{E} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$$

$$\mathbf{F} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$$

Midpoint of a triangle is

$$\mathbf{M} = \frac{\mathbf{A}+\mathbf{B}}{2}$$

By using the above formula, we can find the other two vertices as

$$\mathbf{B} = 2\left(\mathbf{E} - \frac{1}{2}\mathbf{A}\right)$$

$$\mathbf{B} = \begin{pmatrix} -3 \\ 3 \end{pmatrix}$$

$$\mathbf{C} = 2\left(\mathbf{F} - \frac{1}{2}\mathbf{A}\right)$$

$$\mathbf{C} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$$

We can find the centroid by using three vertices A,B and C.

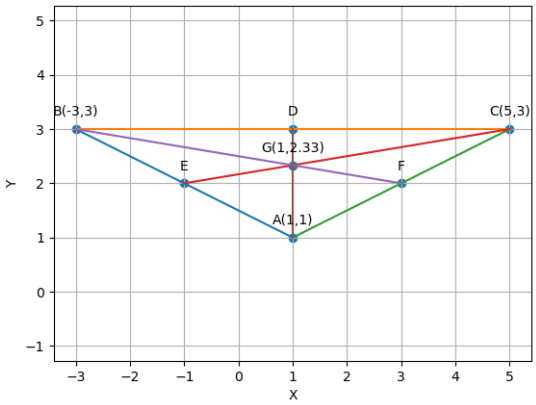
Centroid:

$$\text{Centroid } \mathbf{G} = \frac{(\mathbf{A}+\mathbf{B}+\mathbf{C})}{3}$$

By substituting the vertices in above formula we get centroid as

$$\mathbf{G} = \begin{pmatrix} 1 \\ 7/3 \end{pmatrix}$$

3 Construction



4 Software

The below python code realizes the above construction:

https://github.com/PanjugalaShashikala/FWC_2022097/tree/main/Lines