

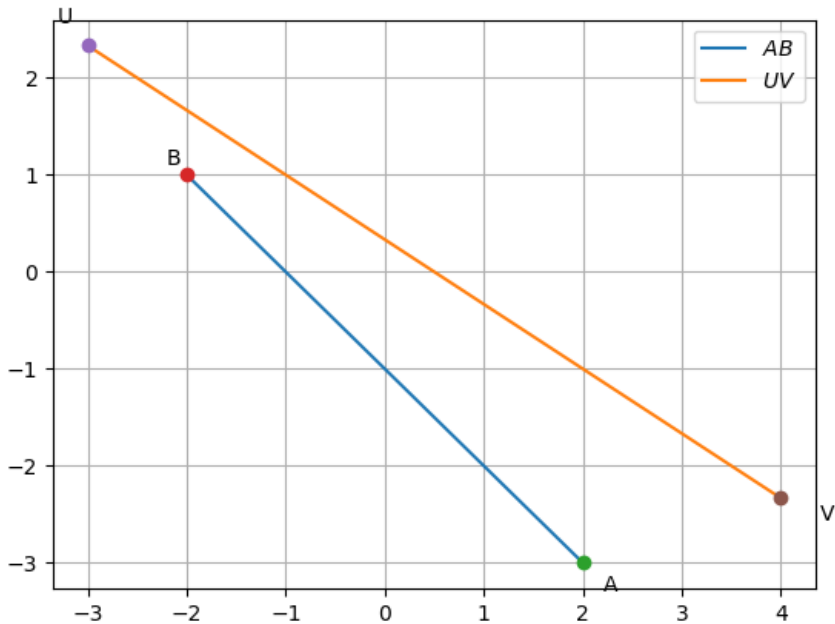
# EE1390

## Matrix Project

EE18BTECH11027 and EE18BTECH11011

Let A  $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$  and B  $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$  be vertices of a triangle ABC. If the centroid of this moves on the line  $2x+3y=1$ , then the locus of the vertex C is -

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let  $A \begin{pmatrix} 2 \\ -3 \end{pmatrix}$  and  $B \begin{pmatrix} -2 \\ 1 \end{pmatrix}$  and  $C$  be vertices of the triangle.

and

$O$  be the centroid of the triangle which lies on the line  $2x+3y=1$

hence,

the matrix equation of given line is

$$\begin{pmatrix} 2 & 3 \end{pmatrix} \mathbf{x} = 1$$

we know that the coordinate of the centroid is the arithmetic mean of the all the three coordinates.

therefore,

$$O = (A+B+C/3)$$

also,

O lies on the line  $(2/3)x=1$

hence it satisfies the equation, therefore

$$(2/3)O=1$$

substituting  $O = (A+B+C)/3$  in -

$$(2/3)O = 1 \quad (1)$$

$$(2/3)(A + B + C)/3 = 1 \quad (2)$$

$$(2/3)(A + B + C) = 3 \quad (3)$$

$$(2/3)C + (2/3)(A + B) = 3 \quad (4)$$

$$(2/3)C = 3 - (2/3)(A + B) \quad (5)$$

$$(2 \ 3)C = 3 - (2 \ 3) \left( \begin{pmatrix} 2 \\ -3 \end{pmatrix} + \begin{pmatrix} -2 \\ 1 \end{pmatrix} \right)$$

$$(2 \ 3)C = 3 - (2 \ 3) \begin{pmatrix} 0 \\ -2 \end{pmatrix}$$

$$(2 \ 3)C = 3 - (-6)$$

$$(2 \ 3)C = 9$$

hence the locus of C is  $n^T \mathbf{x} = 9$  where  $n = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$

