

# 1.6.7

EE24BTECH11002 - Agamjot Singh

## Question:

The value of  $m$  which makes the points  $(0, 0)$ ,  $(2m, -4)$ , and  $(3, 6)$  collinear, is

## Solution:

Let the points be **A**  $(0, 0)$ , **B**  $(3, 6)$  and **C**  $(2m, -4)$ .

The collinearity matrix is given by

$$(\mathbf{B} - \mathbf{A} \quad \mathbf{C} - \mathbf{A})^T = \begin{pmatrix} 3 & 6 \\ 2m & -4 \end{pmatrix} \quad (1)$$

$$\xrightarrow{R_1 = \frac{R_1}{2}} \begin{pmatrix} 1 & 2 \\ 2m & -4 \end{pmatrix} \xrightarrow{R_2 = R_2 - (2m)R_1} \begin{pmatrix} 1 & 2 \\ 0 & -4 - 4m \end{pmatrix} \quad (2)$$

For the points to be collinear, the rank of this matrix has to be one.

$$-4 - 4m = 0 \quad (3)$$

$$m = -1 \quad (4)$$

So, the point **C** is given by

$$\mathbf{C} = \begin{pmatrix} -2 \\ -4 \end{pmatrix} \quad (5)$$

The line joining **A**, **B** and **C** is given by

$$y = 2x \quad (6)$$

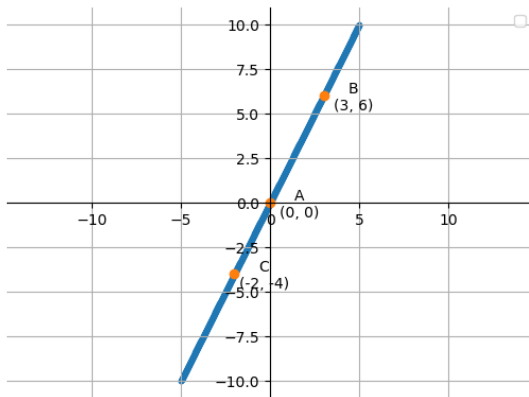


Fig. 0: Line containing points **A**, **B** and **C**