

# 1.6.7

EE24BTECH11002 - Agamjot Singh

## Question:

Find a relation between  $x$  and  $y$  if the points  $(x, y)$ ,  $(1, 2)$  and  $(7, 0)$  are collinear.

## Solution:

Let the points be **A**  $(1, 2)$ , **B**  $(7, 0)$  and **C**  $(x, y)$ .

The collinearity matrix is given by

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

$$\xrightarrow{R_2 = R_2 + \frac{R_1}{3}} \begin{pmatrix} 6 & x - 1 \\ 0 & y - 2 + \frac{x-1}{3} \end{pmatrix} \quad (2)$$

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

$$y - 2 + \frac{x - 1}{3} = 0 \quad (3)$$

$$x + 3y - 7 = 0 \quad (4)$$

The relation between  $x$  and  $y$  is a line.

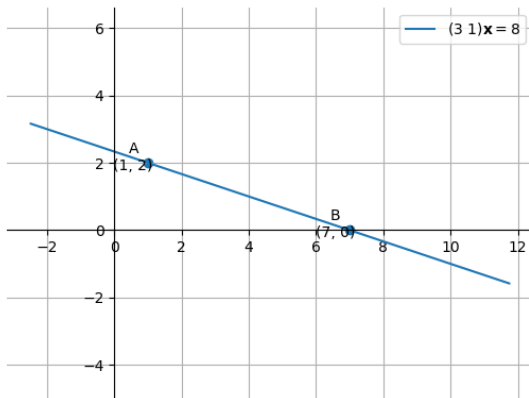


Fig. 0: Line which represents the relation between  $x$  and  $y$