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 $\mathbf{A}(1,2)$, $\mathbf{B}(7,0)$ and $\mathbf{C}(x,y)$.

The collinearity matrix is given by

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

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

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

$$y - 2 + \frac{x - 1}{3} = 0 \tag{3}$$

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

The relation between x and y is a line.

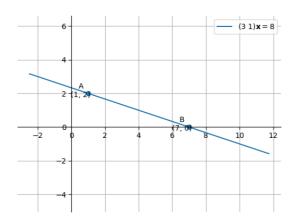


Fig. 0: Line which represents the relation between x and y