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

The collinearity matrix is given by

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

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

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

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

$$x+3y-7 = 0 \tag{4}$$

The relation between x and y is a line.

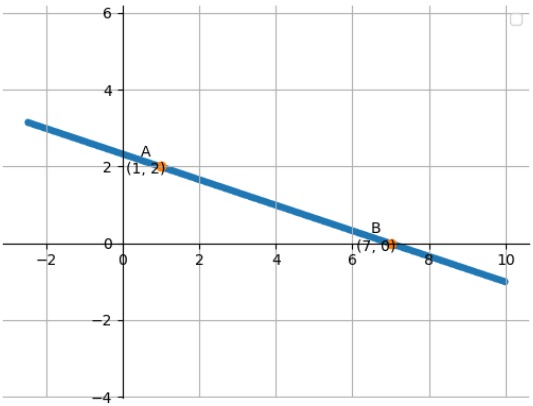

Fig. 0: Line which represents the relation between x and y