1.6.8

EE25BTECH11058 - Tangellapalli Mohana Krishna Sushma

Question: If three points $(x,-1)$, $(\mathbf{2},\mathbf{1})$ and $(\mathbf{4},\mathbf{5})$ are collinear, find the value of x.

Solution:

Point	x	y
A	x	-1
B	2	1
C	4	5

collinearity matrix can be expressed as

$$\begin{pmatrix} A-B & A-C \end{pmatrix} = \begin{pmatrix} x-2 & x-4 \\ -2 & -6 \end{pmatrix}$$

Changing the matrix in echelon form using row operation,

$$\begin{pmatrix} x-2 & x-4 \\ -2 & -6 \end{pmatrix} \xrightarrow{R_2 \leftrightarrow R_1} \begin{pmatrix} -2 & -6 \\ x-2 & x-4 \end{pmatrix} \xrightarrow{R_2 \to R_2 + ((x-2)/2) * R_1} \begin{pmatrix} -2 & -6 \\ 0 & -2x+2 \end{pmatrix}$$

To make the following matrix Rank 1. (i.e., To prove collinearity) Thus, we make the bottom row elements zero.

$$\begin{aligned} -2x + 2 &= 0 \\ \Rightarrow x &= 1 \end{aligned}$$

Hence, The value of x = 1.

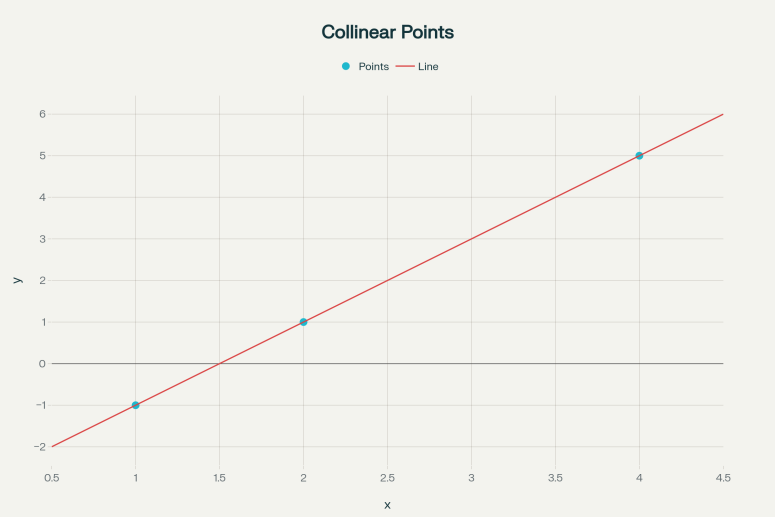

Fig. 0: Collinearity