1.1.6.13

ee25btech11063-vejith

Question:
The points $(0,5)$,$(0,-9)$ and $(3,6)$ are not collinear.
Solution:

point	Name
$(0,5)$	Point A
$(0,-9)$	Point B
$(3,6)$	Point C

TABLE 0: Variables Used

3 points are collinear if the rank of collinearity matrix is 1.Rank of matrix is 1 means no.of rows with non zero entries is 1. (1)

The collinearity matrix is given by (2)

$$\begin{pmatrix}\mathbf{B}-\mathbf{A} & \mathbf{C}-\mathbf{A}\end{pmatrix}^{T} = \begin{pmatrix}0 & -14\\ 3 & 1\end{pmatrix} \tag{3}$$

(4)

$$\begin{pmatrix}0 & -14\\ 3 & 1\end{pmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \begin{pmatrix}3 & 1\\ 0 & -14\end{pmatrix} \tag{5}$$

(6)

$$\begin{pmatrix}3 & 1\\ 0 & -14\end{pmatrix} \xleftrightarrow{R_1 \leftarrow \frac{1}{3}R_1} \begin{pmatrix}1 & \frac{1}{3}\\ 0 & -14\end{pmatrix} \tag{7}$$

$$\begin{pmatrix}1 & \frac{1}{3}\\ 0 & -14\end{pmatrix} \xleftrightarrow{R_2 \leftarrow \frac{-1}{14}R_2} \begin{pmatrix}1 & \frac{1}{3}\\ 0 & 1\end{pmatrix} \tag{8}$$

The above matrix now is in row echelon form.Rank of a matix in echelon form is number of non zero rows.so,The rank of the above collinearity matrix is 2
$\implies$ given 3 points A,B,C are not collinear.

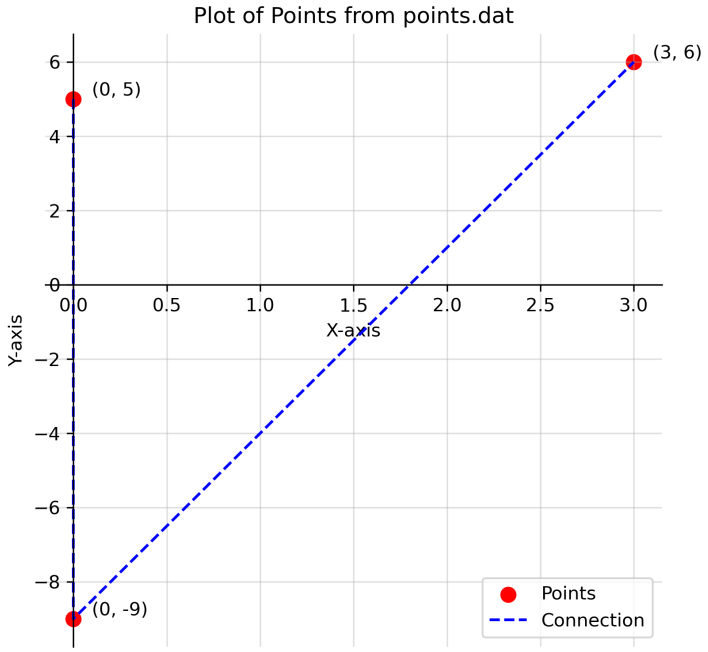

Fig. 0: Triangle formed by points A,B,C