1.1.6.13

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

Vector	Name
$\begin{pmatrix}0\\5\end{pmatrix}$	vector **A**
$\begin{pmatrix}0\\-9\end{pmatrix}$	vector **B**
$\begin{pmatrix}3\\6\end{pmatrix}$	vector **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)

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.

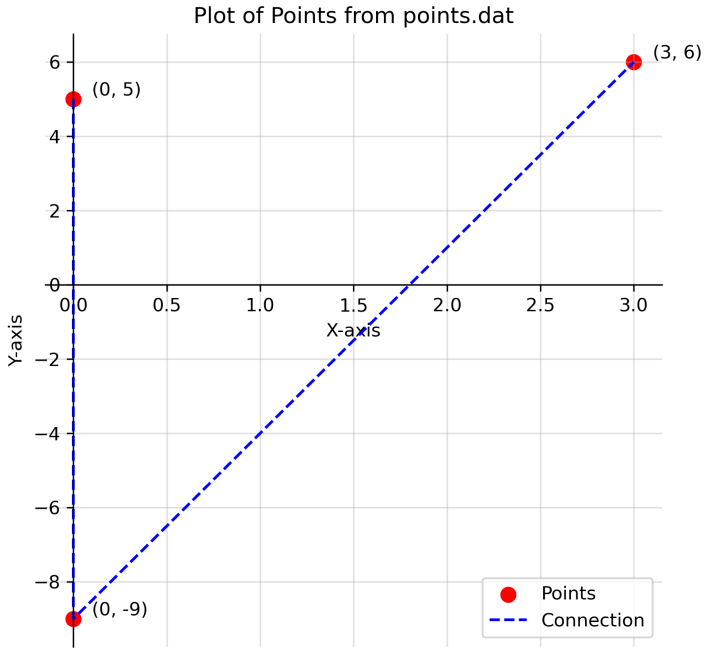

Fig. 0: Triangle formed by points A,B,C