1.1.6.13

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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)

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

$$(4)$$

$$\begin{pmatrix} 0 & -14 \\ 3 & 1 \end{pmatrix} \xleftrightarrow{R_2 \leftarrow R_1 + 14R_2} \begin{pmatrix} 0 & -14 \\ 42 & 0 \end{pmatrix} \quad (5)$$

$$(6)$$

$$\begin{pmatrix} 0 & -14 \\ 3 & 1 \end{pmatrix} \xleftrightarrow{R_1 \leftarrow R_1 + 14R_2} \begin{pmatrix} 42 & -0 \\ 3 & 1 \end{pmatrix} \quad (7)$$

But for above matrix by applying any row reduction also we can't create rows with zero entries in matrix.
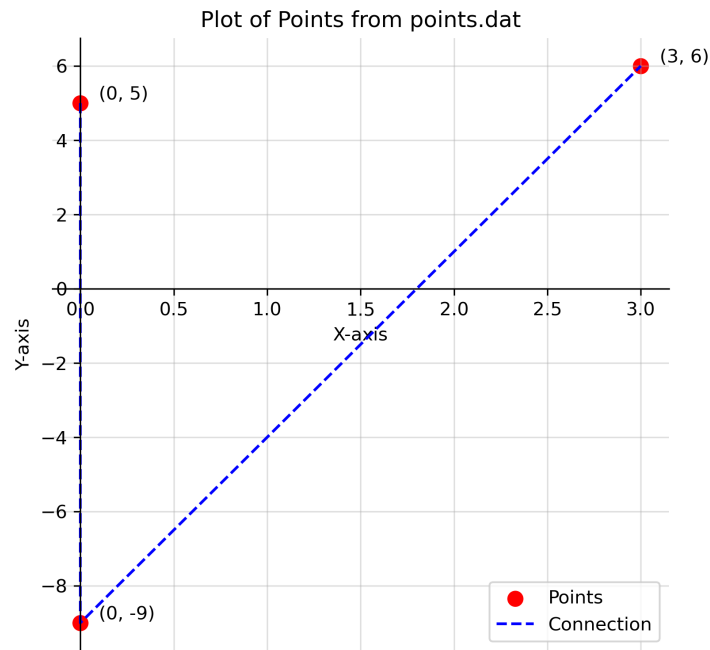The rank of the above collinearity matrix is 2
$\implies$ given 3 points A,B,C are not collinear.

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