1.6.12

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Question:

Show that point $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$ lies on the line segment joining the points **A** $\begin{pmatrix} -4 \\ 6 \end{pmatrix}$ and **B** $\begin{pmatrix} -4 \\ -6 \end{pmatrix}$.

Solution:

Name	Point
A	$\begin{pmatrix} -4 \\ 6 \end{pmatrix}$
B	$\begin{pmatrix} -4 \\ -6 \end{pmatrix}$
C	$\begin{pmatrix} -4 \\ 2 \end{pmatrix}$

TABLE 0: Variables Used

The Collinearity matrix is given by

$$\left(\mathbf{B} - \mathbf{A} \quad \mathbf{C} - \mathbf{A} \right)^T = \begin{pmatrix} 0 & -12 \\ 0 & -4 \end{pmatrix} \tag{0.1}$$

$$\xleftarrow{R_2 \rightarrow R_2 - \frac{1}{3}R_1} \begin{pmatrix} 0 & -12 \\ 0 & 0 \end{pmatrix} \tag{0.2}$$
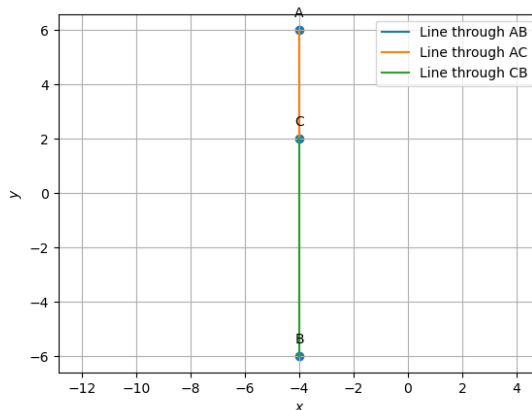
Since the rank of the Collinearity matrix is 1, the points are collinear

Fig. 0.1: Line through the given points