1-1.6-11

EE24BTECH11005 - Arjun Pavanje

Question:

If the points $\mathbf{A}\begin{pmatrix}1\\2\end{pmatrix}$, $\mathbf{O}\begin{pmatrix}0\\0\end{pmatrix}$ and $\mathbf{B}\begin{pmatrix}a\\b\end{pmatrix}$ are collinear, then find the relation between a and b.

Solution:

Variable	Description
A	Point $\begin{pmatrix}1\\2\end{pmatrix}$
0	$\begin{pmatrix}0\\0\end{pmatrix}$ point
B	$\begin{pmatrix}a\\b\end{pmatrix}$ point

TABLE I: Variables Used

First we should construct the collinearity matrix with the given points A,O,B

$$\begin{pmatrix}O-A\\B-O\end{pmatrix} \tag{1}$$

$$\begin{pmatrix}-1 & -2\\a & b\end{pmatrix} \xleftarrow{R_2 \to R_2 - aR_1} \begin{pmatrix}-1 & -2\\0 & b-2a\end{pmatrix} \tag{2}$$

rank should be 1 for collinearity, for that R_2 must be 0, so

$$b - 2a = 0 \tag{3}$$
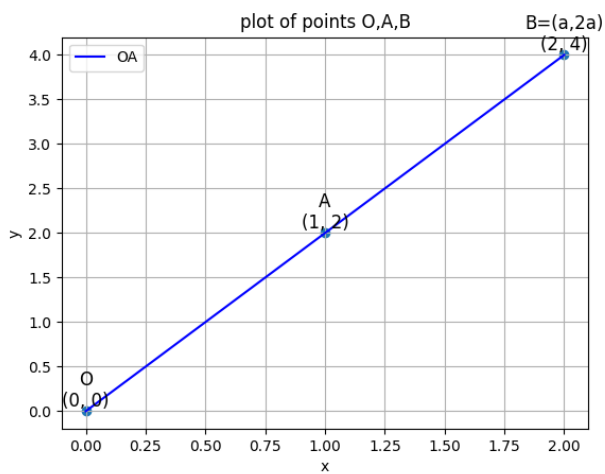
$$\therefore b = 2a \tag{4}$$

The required relation between a, and b is, $b = 2a$

Fig. 1: Plot of the points A,O,B