1-1.6-11

EE24BTECH11005 - Arjun Pavanje

Question:
If the points $\mathbf{A}\,(1,2)$, $\mathbf{O}\,(0,0)$ and $\mathbf{C}\,(a,b)$ are collinear, then find the relation between a and b.

Solution:

Variable	Description
A	Point $(1,2)$
0	$(0,0)$ point
B	(a,b) point
a, b	x, y coordinates of point B between whom relation is to be found

TABLE I: Variables Used

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

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

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

given that the three points are collinear, the rank of collinearity matrix should be 1 for that to occur, the R_2 must be fully 0. Therefore,

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

$$\therefore b = 2a \tag{4}$$

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

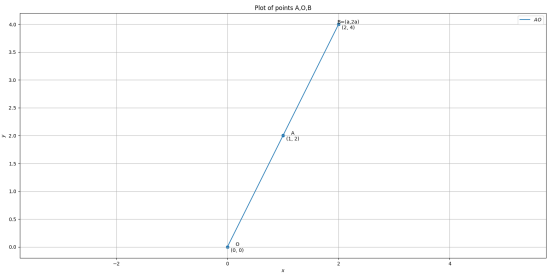

Fig. 1: Plot of the points A,O,B