1-1.7-3

EE24BTECH11005 - Arjun Pavanje

Question:
Show that the points $\mathbf{A}\left(-2\hat{i}+3\hat{j}+5\hat{k}\right)$, $\mathbf{B}\left(\hat{i}+2\hat{j}+3\hat{k}\right)$, and $\mathbf{C}\left(7\hat{i}-\hat{k}\right)$ are collinear
Solution:

Variable	Description
A	Point $(2, 3)$
B	$(4, k)$ point
C	$(6, -3)$ point
k	value to be found

TABLE I: Variables Used

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

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

$$\begin{pmatrix} 3 & -1 & -2 \\ 6 & -2 & -4 \end{pmatrix} \xleftrightarrow{R_2 \to R_2 - 2R_1} \begin{pmatrix} 3 & -1 & -2 \\ 0 & 0 & 0 \end{pmatrix} \tag{2}$$

There is one, non-zero row, rank of matrix is 1, $\therefore$ the 3 points are collinear

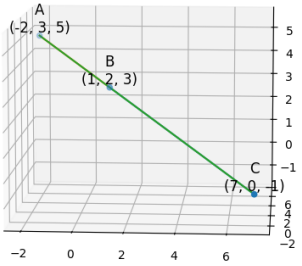

Fig. 1: Plot of the points A,B,C