ASSIGNMENT-2

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Vector Arithmetic(Rank)

Question(1.6.4) Show that the vectors $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $-4\hat{i} + 6\hat{j} - 8\hat{k}$ are collinear.

Solution: We have the vectors

Point	Vector
Matrix A	$\begin{pmatrix} 2 \\ -3 \\ 4 \end{pmatrix}$
Matrix B	$\begin{pmatrix} -4 \\ 6 \\ -8 \end{pmatrix}$

The matrix

$$\begin{pmatrix} A & B \end{pmatrix}^T = \begin{pmatrix} 2 & -3 & 4 \\ -4 & 6 & -8 \end{pmatrix} \tag{0.1}$$

$$\xleftrightarrow{R_2 = R_2 + 2R_1} \begin{pmatrix} 2 & -3 & 4 \\ 0 & 0 & 0 \end{pmatrix} \tag{0.2}$$

$$\tag{0.3}$$

which has rank 1. Hence, we conclude the given vectors are collinear

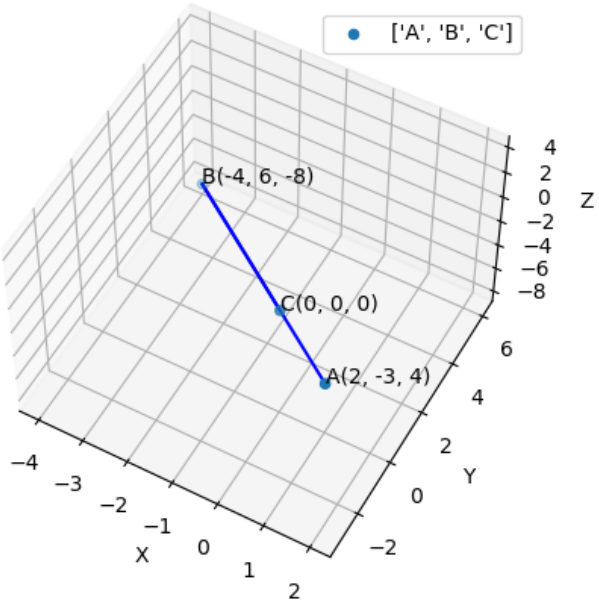

Fig. 0.1: Plot of **A**,**B**