

# 1.6.5

EE24BTECH11001 - Aditya Tripathy

## Question:

Show that the points  $(2, 3, 4)$ ,  $(-1, -2, 1)$ ,  $(5, 8, 7)$

## Solution:

From (1.1.9.1), Points A, B, C are defined to be collinear if

$$\text{rank} \begin{pmatrix} (\mathbf{B} - \mathbf{A})^\top \\ (\mathbf{C} - \mathbf{A})^\top \end{pmatrix} = 1 \quad (0.1)$$

$$(0.2)$$

So, forming the collinearity matrix and doing row operations,

$$\begin{pmatrix} -3 & -5 & -3 \\ 3 & 5 & 3 \end{pmatrix} \xrightarrow{R_2=R_2+R_1} \begin{pmatrix} -3 & -5 & -3 \\ 0 & 0 & 0 \end{pmatrix} \quad (0.3)$$

$$(0.4)$$

Since there is only one non-zero row,  $\text{rank} = 1$ . Hence the points are collinear.

3D Scatter Plot of Random Points and Tetrahedron Vertices

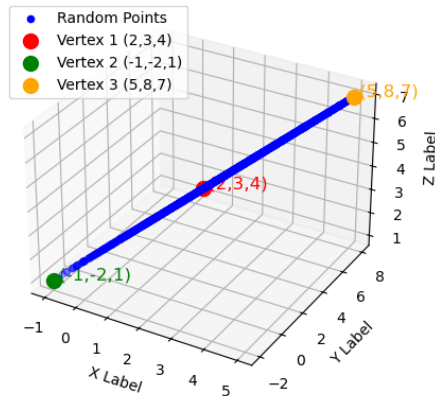


Fig. 0.1: Line joining the three given points