

# 1.6.17

EE24BTECH11058 - P.Shiny Diavajna

**Question:** Using vectors, find the value of  $k$  such that points  $(k, -10, 3)$ ,  $(1, -1, 3)$  and  $(3, 5, 3)$  are collinear.

**Solution:**

Variable	Description
$\begin{pmatrix} k & -10 & 3 \end{pmatrix}$	Point <b>A</b>
$\begin{pmatrix} 1 & -1 & 3 \end{pmatrix}$	Point <b>B</b>
$\begin{pmatrix} 3 & 5 & 3 \end{pmatrix}$	Point <b>C</b>
$k$	$x$ coordinate of <b>A</b>

TABLE 0: Variables Used

$$\begin{aligned} \begin{pmatrix} C - B & B - A \end{pmatrix}^T &= \begin{pmatrix} 2 & 6 & 0 \\ 1 - k & 9 & 0 \end{pmatrix} \\ &\xrightarrow{R_2 = R_1 - \frac{6}{9}R_1} \begin{pmatrix} 2 & 6 & 0 \\ \frac{4+2k}{3} & 0 & 0 \end{pmatrix} \end{aligned}$$

$$\begin{aligned} \frac{4+2k}{3} &= 0 \\ k &= -2 \end{aligned}$$

3D Plot of Points and Lines

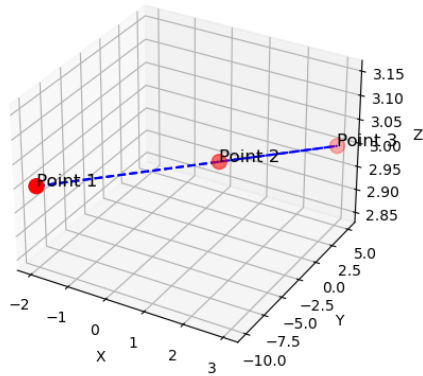


Fig. 0.1: Plot for points A , B and C