1.6.5

EE24BTECH11001 - Aditya Tripathy

Question:
Show that the points $(2,3,4)$, $(-1,-2,1)$,$(5,8,7)$ are collinear.
Solution:
From (1.1.9.1), Points A, B, C are defined to be collinear if

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

(0.2)

So, forming the collinearity matrix and doing row operations,

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

(0.4)

Since there is only one non-zero row, rank = 1. Hence the points are collinear.

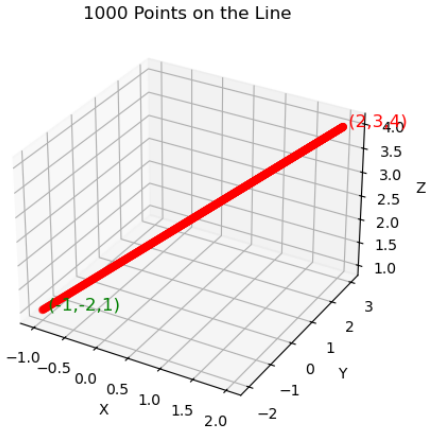

Fig. 0.1: Line joining the three given points