1.6.23

EE24BTECH11001 - Aditya Tripathy

Question:
Are $\mathbf{A}\,(3,1)\,,\mathbf{B}\,(6,4)$ and $\mathbf{C}\,(8,6)$ collinear?
Solution:
From (1.1.9.1), Points A, B, C are defined to be collinear if

$$rank\begin{pmatrix}\mathbf{B}-\mathbf{A} & \mathbf{C}-\mathbf{A}\end{pmatrix} = 1 \tag{0.1}$$

(0.2)

So, forming the collinearity matrix and doing row operations,

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

(0.4)

Since there is only 1 non-zero row, rank = 1. Hence the points $\mathbf{A},\mathbf{B}$ and $\mathbf{C}$ are collinear.

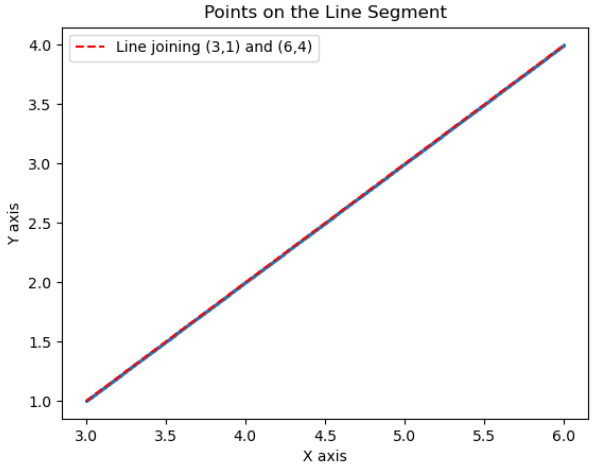

Fig. 0.1: Line joining $\mathbf{A},\mathbf{B}$ and $\mathbf{C}$