1.6.18

AI25BTECH11003 - Bhavesh Gaikwad

Question: Prove that points A(2,1), B(0,5) and C(-1,2) are not collinear.

Solution:

$$\text{B-A}=\begin{pmatrix}0-2\\5-1\end{pmatrix}=\begin{pmatrix}-2\\4\end{pmatrix} \qquad C-A=\begin{pmatrix}-1-2\\2-1\end{pmatrix}=\begin{pmatrix}-3\\1\end{pmatrix}$$

$$\text{M}=\begin{pmatrix}B-A & C-A\end{pmatrix}=\begin{pmatrix}-2 & -3\\4 & 1\end{pmatrix}$$

Row-reduce to compute the rank:

$$\begin{pmatrix}-2 & -3\\4 & 1\end{pmatrix}\xrightarrow{R_2\leftarrow R_2+2R_1}\begin{pmatrix}-2 & -3\\0 & -5\end{pmatrix}$$

The echelon form has two nonzero rows, hence rank(M)=2≠1

$$\boxed{Therefore,\ The\ points\ A(2,1),\ B(0,5)\ and\ C(-1,2)\ are\ not\ collinear.} \tag{0.1}$$

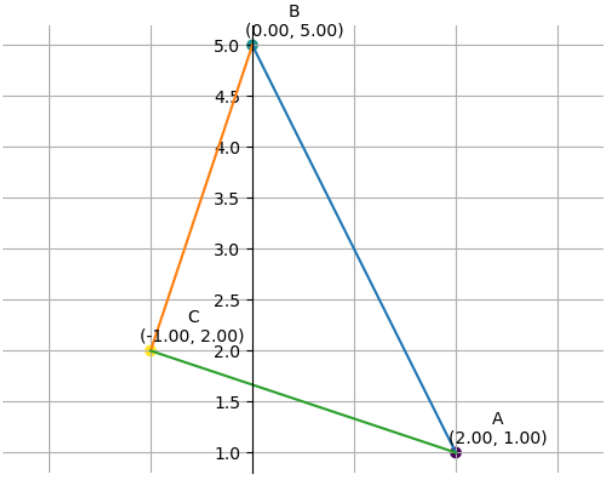

Fig. 0.1: Graph