1.6.18

AI25BTECH11003 - Bhavesh Gaikwad

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

Solution:

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

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

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

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

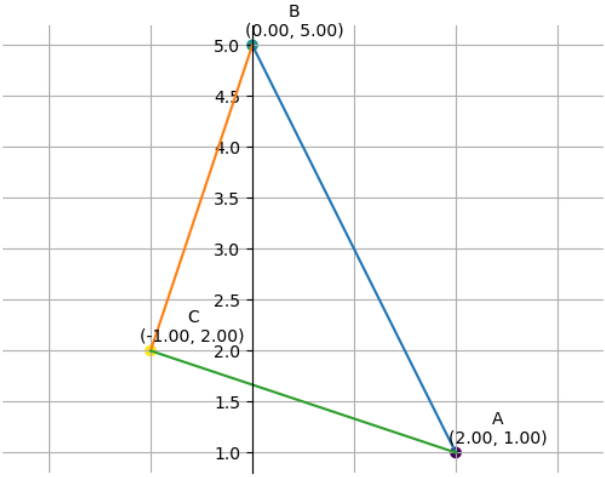

Fig. 0.1: Graph