1.6.27 Matgeo

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Question

Prove that the three points **A** (-4,6,10) , **B** (2,4,6) and **C** (14,0,-2) are collinear.

Solution

If ABC are collinear , then the matrix should have rank 1.

$$\begin{pmatrix} \mathbf{B}-\mathbf{A} & \mathbf{C}-\mathbf{A} \end{pmatrix}^T$$

$$\begin{pmatrix} \mathbf{B}-\mathbf{A} & \mathbf{C}-\mathbf{A} \end{pmatrix}^T = \begin{bmatrix} 6 & -2 & -4 \\ 18 & -6 & -12 \end{bmatrix} \tag{1}$$

$$R_2 = R_2 - 3R_1 \tag{2}$$

$$\begin{bmatrix} 6 & -2 & -4 \\ 0 & 0 & 0 \end{bmatrix} \tag{3}$$

Graphical Representation

Since all the elements of R_2 are zero, the rank of the matrix is one. Hence ABC are collinear points.