

# 1-1.5-27

AI24BTECH11002 - K.AKSHAY TEJA

## Question:

Show that the points **P**(-2, 3, 5), **Q**(1, 2, 3) and **R**(7, 0, -1) are collinear.

## Solution:

Variable	Description
P	(-2, 3, 5)
Q	(1, 2, 3)
R	(7, 0, -1)

TABLE 0: Coordinates of points *P*, *Q* and *R*

Points **P**, **Q** and **R** are collinear if

$$\text{rank}(\mathbf{P} \quad \mathbf{Q} \quad \mathbf{R})^T = 2 \quad (0.1)$$

$$\Rightarrow \begin{pmatrix} -2 & 3 & 5 \\ 1 & 2 & 3 \\ 7 & 0 & -1 \end{pmatrix} \xleftrightarrow{R_2 \rightarrow 2R_2 + R_3} \begin{pmatrix} -2 & 3 & 5 \\ 0 & 7 & 11 \\ 7 & 0 & -1 \end{pmatrix} \quad (0.2)$$

$$\xleftrightarrow{R_3 \rightarrow 2R_3 + 7R_1} \begin{pmatrix} -2 & 3 & 5 \\ 0 & 7 & 11 \\ 0 & 21 & 33 \end{pmatrix} \xleftrightarrow{R_3 \rightarrow R_3 - 3R_2} \begin{pmatrix} -2 & 3 & 5 \\ 0 & 7 & 11 \\ 0 & 0 & 0 \end{pmatrix} \quad (0.3)$$

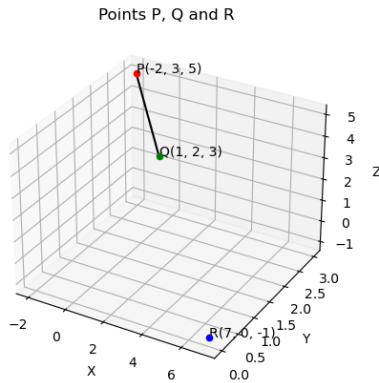


Fig. 0.1: Plot of points P, Q and R