1.8.4

AI25BTECH110030 - SARVESH TAMGADE

Question:
Find the coordinates of a point on Y axis which is at a distance of $5\sqrt{2}$ from the point $P(3,-2,5)$.
Solution:
Any point Q on the Y-axis has the form $(0,y,0)$.
The distance between Q and $P(3,-2,5)$ is given by:

$$|PQ| = \sqrt{(0-3)^2+(y+2)^2+(0-5)^2}$$

Given that $|PQ| = 5\sqrt{2}$:

$$\sqrt{9+(y+2)^2+25} = 5\sqrt{2}$$
$$\sqrt{34+(y+2)^2} = 5\sqrt{2}$$
$$34+(y+2)^2 = 50$$
$$(y+2)^2 = 16$$
$$y+2 = \pm 4$$
$$y = 2 \quad \text{or} \quad y = -6$$

Answer: The required points on the Y-axis are:

$$(0,2,0) \quad \text{and} \quad (0,-6,0)$$

Graph:

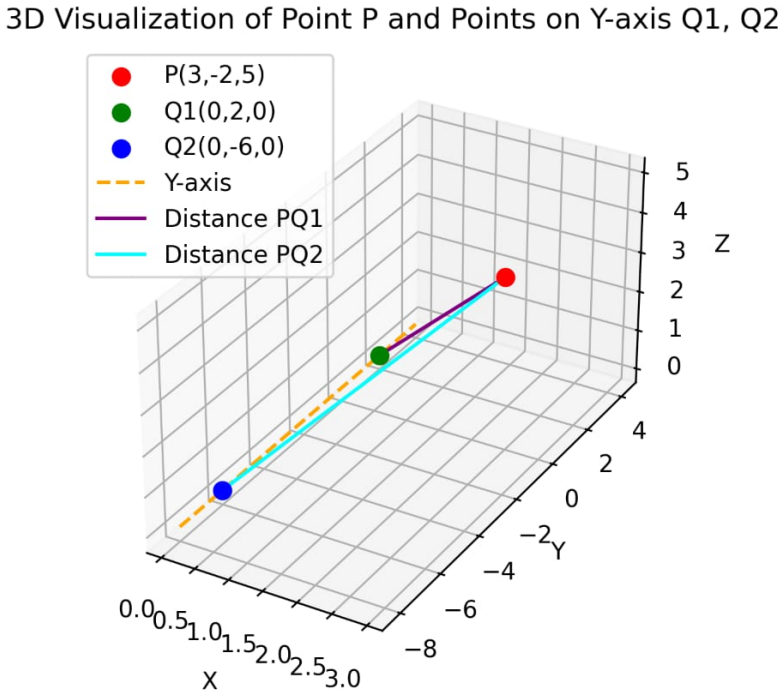

Fig. 1: 3D Visualization of Point P and Points on Y-axis Q1,Q2