1.8.4

EE24BTECH11058 - P.Shiny Diavajna

Question: Find the coordinates of a point on Y axis which is at a distance of $5\sqrt{2}$ from the point $\mathbf{P}\left(3,-2,5\right)$

Solution:

Variable	Description
$\mathbf{P}\left(3,-2,5\right)$	Point $\mathbf{P}$
$\mathbf{Q}\left(0,y,0\right)$	Point on Y axis
Q1 ,**Q2**	Possible Points of $\mathbf{Q}$
y	y coordinate of the point $\mathbf{Q}$
l,m,n	Directional cosines of line joining $\mathbf{P}$ and $\mathbf{Q}$
r	Distance between $\mathbf{P}$ and $\mathbf{Q}$

TABLE 0: Variables Used

$$\mathbf{Q} = \mathbf{P} + \begin{pmatrix} l \\ m \\ n \end{pmatrix} r$$

$$\begin{pmatrix} 0 \\ y \\ 0 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \\ 5 \end{pmatrix} + \begin{pmatrix} l \\ m \\ n \end{pmatrix} 5\sqrt{2}$$

$$l = \frac{-3}{5\sqrt{2}}$$

$$n = \frac{-5}{5\sqrt{2}}$$

$$l^2 + m^2 + n^2 = 1$$

$$m = \pm\frac{4}{5\sqrt{2}}$$

$$y = -6 \,(or)\, y = 2$$

$$\mathbf{Q1} = \begin{pmatrix} 0 \\ -6 \\ 0 \end{pmatrix}, \mathbf{Q2} = \begin{pmatrix} 0 \\ 2 \\ 0 \end{pmatrix}$$

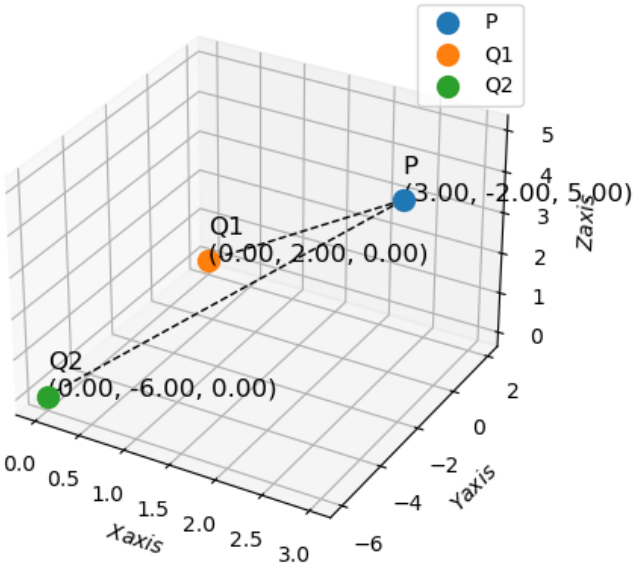

Fig. 0.1: Plot of P, Q1 and Q2