1.11.8

AI25BTECH11006 - Nikhila

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Question

Find the direction cosines of the line joining the points **P**(4,3,-5) and **Q**(-2,1,-8).

Solution

The unit vector in the direction of $\mathbf{PQ}$ is given as

$$\frac{\mathbf{Q}-\mathbf{P}}{\|\mathbf{Q}-\mathbf{P}\|}$$

$$\mathbf{Q}-\mathbf{P}=\begin{pmatrix}-6\\-2\\-3\end{pmatrix} \tag{1}$$

$$\|\mathbf{Q}-\mathbf{P}\|=\sqrt{(-6)^2+(-2)^2+(-3)^2}=7 \tag{2}$$

$$\frac{\mathbf{Q}-\mathbf{P}}{\|\mathbf{Q}-\mathbf{P}\|}=\frac{1}{7}\begin{pmatrix}6\\-2\\-3\end{pmatrix}=\begin{pmatrix}\frac{6}{7}\\-\frac{2}{7}\\-\frac{3}{7}\end{pmatrix} \tag{3}$$

Graphical Representation

The elements of this matrix are the direction cosines and the plot of the unit vector along **PQ**