1.6.23

AI25BTECH11008 - Chiruvella Harshith Sharan

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

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

Solution:

The direction vector of the line is

$$\mathbf{PQ} = \mathbf{Q} - \mathbf{P} = \begin{pmatrix} -2 \\ 1 \\ 8 \end{pmatrix} - \begin{pmatrix} 4 \\ 3 \\ -5 \end{pmatrix} = \begin{pmatrix} -6 \\ -2 \\ 13 \end{pmatrix}.$$

The magnitude of this vector is

$$|\mathbf{PQ}| = \sqrt{(-6)^2 + (-2)^2 + (13)^2} = \sqrt{36 + 4 + 169} = \sqrt{209}.$$

Hence, the direction cosines are

$$l = \frac{-6}{\sqrt{209}}, \quad m = \frac{-2}{\sqrt{209}}, \quad n = \frac{13}{\sqrt{209}}.$$

Thus, the direction cosines of the line are

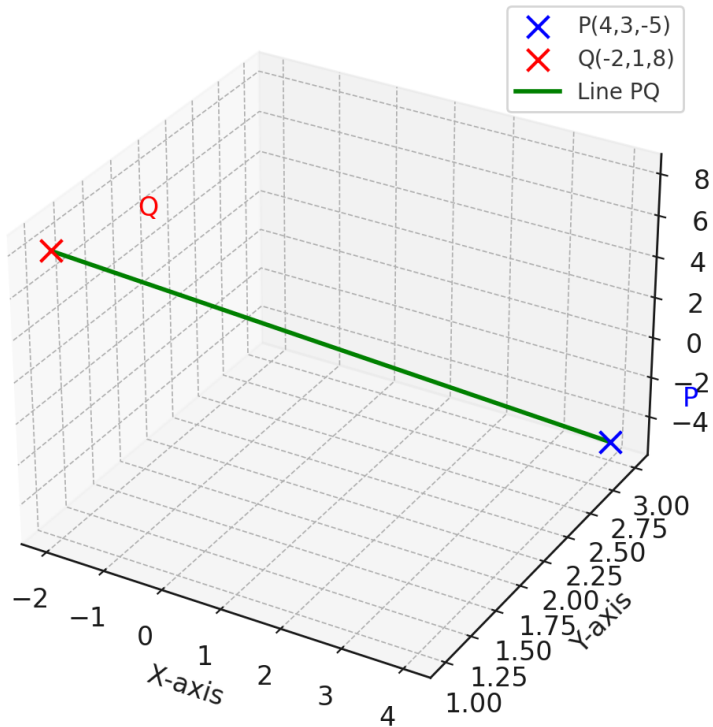$$\begin{pmatrix} \frac{-6}{\sqrt{209}} \\ \frac{-2}{\sqrt{209}} \\ \frac{13}{\sqrt{209}} \end{pmatrix}.$$

Fig. 0.1: Graph showing collinear points A, B, C