AI24BTECH11031 - Shivram S

Question:

Find the position vector of a point **R** which divides the line joining two points **P** and **Q** whose position vectors are $\hat{i} + 2\hat{j} - \hat{k}$ and $-\hat{i} + \hat{j} + \hat{k}$ respectively, in the ratio 2:1

- 1) internally
- 2) externally

Solution:

1) Using section formula (1.1.4.1), the desired point is

$$\mathbf{R} = \frac{\mathbf{Q} + \frac{1}{2}\mathbf{P}}{1 + \frac{1}{2}} = \frac{1}{1 + \frac{1}{2}} \begin{pmatrix} -1\\1\\1\\1 \end{pmatrix} + \frac{1}{2} \begin{pmatrix} 1\\2\\-1 \end{pmatrix} = \begin{pmatrix} -\frac{1}{3}\\\frac{4}{3}\\\frac{1}{3} \end{pmatrix}$$
(1.1)

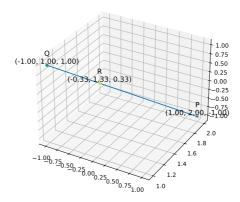


Fig. 1.1: R divides PQ internally in the ratio 2:1

2) Using section formula (1.1.4.1), the desired point is

$$\mathbf{R} = \frac{\mathbf{Q} - \frac{1}{2}\mathbf{P}}{1 - \frac{1}{2}} = \frac{1}{1 - \frac{1}{2}} \begin{pmatrix} -1\\1\\1 \end{pmatrix} - \frac{1}{2} \begin{pmatrix} 1\\2\\-1 \end{pmatrix} = \begin{pmatrix} -3\\0\\3 \end{pmatrix}$$
(2.1)

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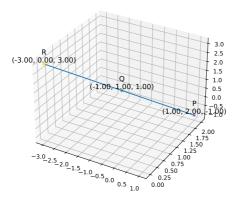


Fig. 2.1: R divides PQ externally in the ratio 2:1