

EE2802: Assignment2

Nikam Pratik Balasaheb

1 PROBLEM

Find the position vector of a point R which divides the line joining two points $P = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$ and

$Q = \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix}$ in the ratio 2:1

- 1) internally
- 2) externally

$$\mathbf{P} - \mathbf{R} = 2(\mathbf{Q} - \mathbf{R}) \quad (2.0.9)$$

$$\mathbf{P} - \mathbf{R} = 2\mathbf{Q} - 2\mathbf{R} \quad (2.0.10)$$

$$\mathbf{R} = 2\mathbf{Q} - \mathbf{P} \quad (2.0.11)$$

$$= 2 \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix} - \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \quad (2.0.12)$$

$$\mathbf{R} = \begin{pmatrix} -3 \\ 0 \\ 3 \end{pmatrix} \quad (2.0.13)$$

2 SOLUTION

$$\mathbf{P} = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{Q} = \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix} \quad (2.0.2)$$

- 1) When \mathbf{R} divides line segment joining \mathbf{P} and \mathbf{Q} internally,

$$\mathbf{P} - \mathbf{R} = -2(\mathbf{Q} - \mathbf{R}) \quad (2.0.3)$$

$$\mathbf{P} - \mathbf{R} = -2\mathbf{Q} + 2\mathbf{R} \quad (2.0.4)$$

$$\mathbf{R} = \frac{2\mathbf{P} + 1\mathbf{Q}}{3} \quad (2.0.5)$$

$$= \frac{2}{3}\mathbf{P} + \frac{1}{3}\mathbf{Q} \quad (2.0.6)$$

$$= \frac{2}{3} \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix} \quad (2.0.7)$$

$$\mathbf{R} = \begin{pmatrix} \frac{1}{3} \\ \frac{5}{3} \\ \frac{-1}{3} \end{pmatrix} \quad (2.0.8)$$

When \mathbf{R} divides line segment joining \mathbf{P} and \mathbf{Q} externally,

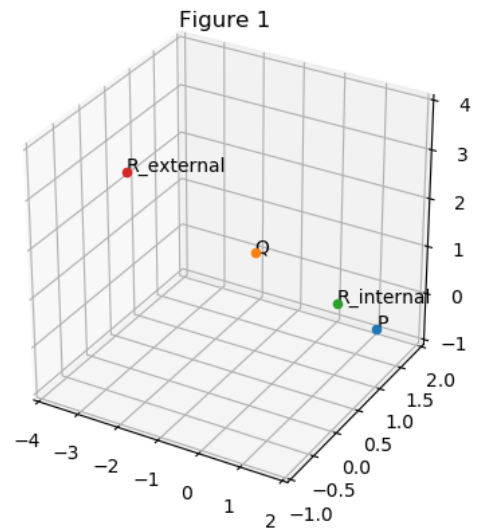


Fig. 1: Figure1