

EE2802: Assignment2

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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

$$\mathbf{PR} = 2\mathbf{QR}$$

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

$$\mathbf{P} - \mathbf{R} = 2\mathbf{Q} - 2\mathbf{R}$$

$$\mathbf{R} = 2\mathbf{Q} - \mathbf{P}$$

$$= 2 \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix} - \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$$

$$\mathbf{R} = \begin{pmatrix} -3 \\ 0 \\ 3 \end{pmatrix}$$

2 SOLUTION

$$\mathbf{P} = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \quad \mathbf{Q} = \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix}$$

- 1) When R divides line segment joining P and Q internally,

$$\mathbf{PR} = -2\mathbf{QR}$$

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

$$\mathbf{P} - \mathbf{R} = -2\mathbf{Q} + 2\mathbf{R}$$

$$\mathbf{R} = \frac{2\mathbf{P} + 1\mathbf{Q}}{3}$$

$$= \frac{2}{3}\mathbf{P} + \frac{1}{3}\mathbf{Q}$$

$$= \frac{2}{3} \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix}$$

$$\mathbf{R} = \begin{pmatrix} \frac{1}{3} \\ \frac{5}{3} \\ \frac{-1}{3} \end{pmatrix}$$

- 2) When R divides line segment joining P and Q externally,

