12.10.2.16

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Class 12, Chapter 10, Exercise 2.16

Q16. Find the position vector of the mid point of the vector joining the points $\mathbf{P} = \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}$ and $\mathbf{Q} = \begin{pmatrix} 4 \\ -1 \\ -2 \end{pmatrix}$.

Solution: The midpoint (Let's say $\mathbf{M}$) of the vector joining $\mathbf{P}$ and $\mathbf{Q}$ will bisect the line joining $\mathbf{P}$ and $\mathbf{Q}$. So we can use section formula to find the position vector of $\mathbf{M}$, with $m = 1, n = 1$. As per section formula,

$$\mathbf{M} = \frac{m \times \mathbf{P} + n \times \mathbf{Q}}{m + n} \tag{1}$$

$$\implies \mathbf{M} = \frac{\mathbf{P} + \mathbf{Q}}{2} \tag{2}$$

$$\implies \mathbf{M} = \frac{1}{2}\begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix} + \frac{1}{2}\begin{pmatrix} 4 \\ -1 \\ -2 \end{pmatrix} \tag{3}$$

$$\implies \mathbf{M} = \begin{pmatrix} 3 \\ 1 \\ 1 \end{pmatrix} \tag{4}$$