12.10.3.17

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Class 12, Chapter 10, Exercise 3.17

17) 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 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 M, with m = 1, n = 1.

$$\begin{aligned} \mathbf{M} &= \frac{1}{2}\mathbf{P} + \frac{1}{2}\mathbf{Q} \\ &= \frac{1}{2}\begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix} + \frac{1}{2}\begin{pmatrix} 4 \\ -1 \\ -2 \end{pmatrix} \\ &= \begin{pmatrix} 3 \\ 1 \\ 1 \end{pmatrix} \end{aligned}$$