

# Question: 12.10.4.12

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## 1 PROBLEM

Find the area of rectangle having A,B,C,D with position vectors  $\begin{pmatrix} -1 \\ \frac{1}{2} \\ 4 \end{pmatrix}$ ,  $\begin{pmatrix} 1 \\ \frac{1}{2} \\ 4 \end{pmatrix}$ ,  $\begin{pmatrix} 1 \\ \frac{-1}{2} \\ 4 \end{pmatrix}$  and  $\begin{pmatrix} -1 \\ \frac{-1}{2} \\ 4 \end{pmatrix}$  respectively.

## 2 SOLUTION

$$\mathbf{A} = \begin{pmatrix} -1 \\ \frac{1}{2} \\ 4 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{B} = \begin{pmatrix} 1 \\ \frac{1}{2} \\ 4 \end{pmatrix} \quad (2.0.2)$$

$$\mathbf{C} = \begin{pmatrix} 1 \\ \frac{-1}{2} \\ 4 \end{pmatrix} \quad (2.0.3)$$

$$\mathbf{D} = \begin{pmatrix} -1 \\ \frac{-1}{2} \\ 4 \end{pmatrix} \quad (2.0.4)$$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} -2 \\ 0 \\ 0 \end{pmatrix} \quad (2.0.5)$$

$$\mathbf{D} - \mathbf{C} = \begin{pmatrix} -2 \\ 0 \\ 0 \end{pmatrix} \quad (2.0.6)$$

$$\mathbf{C} - \mathbf{B} = \begin{pmatrix} 0 \\ -1 \\ 0 \end{pmatrix} \quad (2.0.7)$$

$$\mathbf{D} - \mathbf{A} = \begin{pmatrix} 0 \\ -1 \\ 0 \end{pmatrix} \quad (2.0.8)$$

$\therefore$ , the sides  $\mathbf{A} - \mathbf{B}$  and  $\mathbf{C} - \mathbf{B}$  are adjacent.

Area of the rectangle,

$$\text{Area} = \|(\mathbf{A} - \mathbf{B}) \times (\mathbf{C} - \mathbf{B})\| \quad (2.0.9)$$

$$= 2 \quad (2.0.10)$$

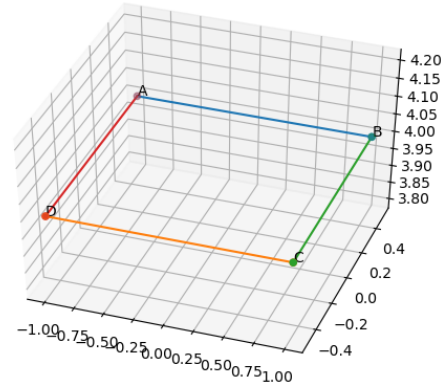


Fig. 0: Rectangle ABCD