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

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

$$\mathbf{B} = \begin{pmatrix}1\\ \frac{1}{2}\\ 4\end{pmatrix} \tag{2.0.2}$$

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

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

$$\mathbf{A}-\mathbf{B} = \begin{pmatrix}-2\\ 0\\ 0\end{pmatrix} \tag{2.0.5}$$

$$\mathbf{D}-\mathbf{C} = \begin{pmatrix}-2\\ 0\\ 0\end{pmatrix} \tag{2.0.6}$$

$$\mathbf{C}-\mathbf{B} = \begin{pmatrix}0\\ -1\\ 0\end{pmatrix} \tag{2.0.7}$$

$$\mathbf{D}-\mathbf{A} = \begin{pmatrix}0\\ -1\\ 0\end{pmatrix} \tag{2.0.8}$$

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

$$Area = \|\mathbf{A}-\mathbf{B}\|\,\|\mathbf{C}-\mathbf{B}\| \tag{2.0.9}$$

$$= 2 \tag{2.0.10}$$

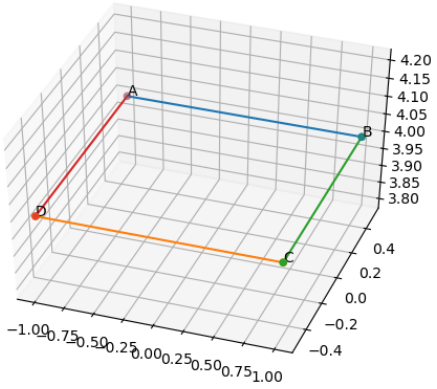

Fig. 0: Rectangle ABCD