Assignment-2

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I. VECTOR ARITHMETIC(CBSE)

Question: AOBC is a rectangle whose three vertices are vertices $\mathbf{A}\,(0,3)$, $\mathbf{O}\,(0,0)$ and $\mathbf{B}\,(5,0)$. The length of its diagonal is

Solution: Direction vector of $\mathbf{AB}$: $m = \mathbf{B} - \mathbf{A}$

$$\mathbf{AB} = \begin{pmatrix} 5 \\ 0 \end{pmatrix} - \begin{pmatrix} 0 \\ 3 \end{pmatrix} = \begin{pmatrix} 5 \\ -3 \end{pmatrix} \tag{1}$$

length of $\mathbf{AB}$(Diagonal):$\|m\| = mm^t$

$$\|\mathbf{AB}\| = \begin{pmatrix} 5 & -3 \end{pmatrix} \begin{pmatrix} 5 \\ -3 \end{pmatrix} \tag{2}$$

$$\|\mathbf{AB}\| = \begin{pmatrix} 5^2 + (-3)^2 \end{pmatrix} \tag{3}$$

$$\|\mathbf{AB}\| = \begin{pmatrix} 25 + 9 \end{pmatrix} \tag{4}$$

$$\|\mathbf{AB}\| = \begin{pmatrix} 34 \end{pmatrix} \tag{5}$$

so, length of diagonal= $\sqrt{34}$.