

3.4.3

AI25BTECH11034 - Sujal Chauhan

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Question

Construct a square of side 3 unit

Solution

Let's consider four points A,B,C,D as vertices of square:

Point	Positon Vector
A	$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$
B	$\begin{pmatrix} 3 \\ 0 \end{pmatrix}$
C	$\begin{pmatrix} 3 \\ 3 \end{pmatrix}$
D	$\begin{pmatrix} 0 \\ 3 \end{pmatrix}$

Figure

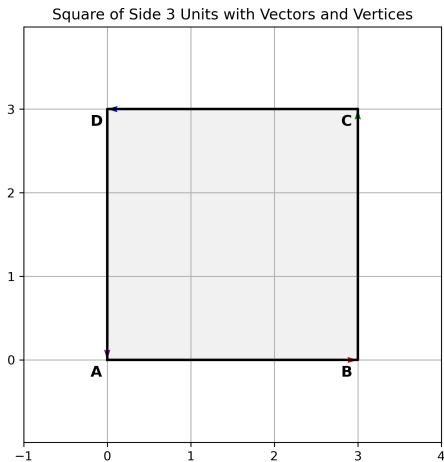


Figure: Caption

Properties of Square

- ① All sides have equal length
- ② Opposite sides are parallel
- ③ Diagonals have equal length
- ④ Adjacent sides are perpendicular to each other

Properties of Square

$$\|\mathbf{A} - \mathbf{B}\| = \|\mathbf{B} - \mathbf{C}\| = \|\mathbf{C} - \mathbf{D}\| = \|\mathbf{D} - \mathbf{A}\| \quad (1)$$

$$\mathbf{A} - \mathbf{B} = \mathbf{D} - \mathbf{C} \quad (2)$$

$$\|\mathbf{A} - \mathbf{C}\| = \|\mathbf{B} - \mathbf{D}\| \quad (3)$$

$$0 = (\mathbf{A} - \mathbf{B})^T (\mathbf{B} - \mathbf{C}) = (\mathbf{B} - \mathbf{C})^T (\mathbf{C} - \mathbf{D}) = (\mathbf{C} - \mathbf{D})^T (\mathbf{D} - \mathbf{A}) = (\mathbf{D} - \mathbf{A})^T (\mathbf{A} - \mathbf{B}) \quad (4)$$