AI25BTECH11034 - SUJAL CHAUHAN
3.4.3

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	$\begin{pmatrix} 0 \\ 3 \end{pmatrix}$

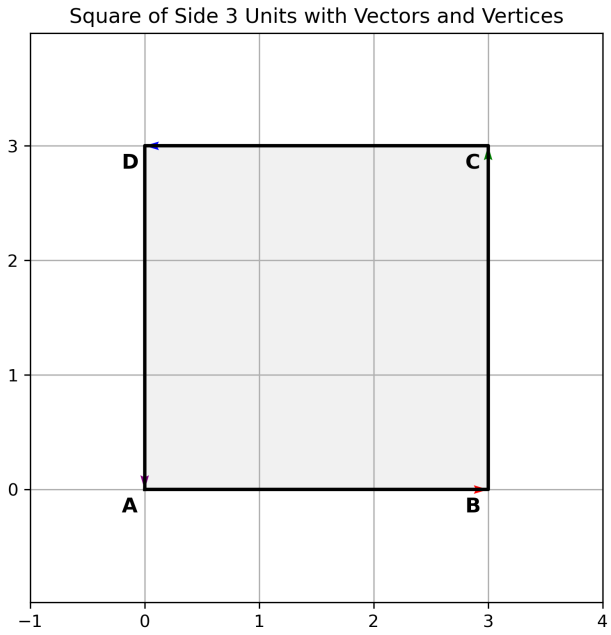

Figure 1: Caption

Properties of square

a) All sides have equal length

b) Opposite sides are parallel

c) Diagonals have equal length

d) Adjecent sides are perpendicular to each other

$$\|\mathbf{A}-\mathbf{B}\| = \|\mathbf{B}-\mathbf{C}\| = \|\mathbf{C}-\mathbf{D}\| = \|\mathbf{D}-\mathbf{A}\| \tag{1}$$

$$\mathbf{A}-\mathbf{B} = \mathbf{D}-\mathbf{C} \tag{2}$$

$$\|\mathbf{A}-\mathbf{C}\| = \|\mathbf{B}-\mathbf{D}\| \tag{3}$$

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