1.9.34

Puni Aditya - EE25BTECH11046

Question:
Find the distance of the point $(-6, 8)$ from the origin.

Solution:
Let the given point be

$$\mathbf{P} = \begin{pmatrix} -6 \\ 8 \end{pmatrix}$$

The distance of the point from the origin is the length of its position vector $\mathbf{P}$. The formula is given as

$$\|\mathbf{P}\| = \sqrt{\mathbf{P}^\top \mathbf{P}} \tag{1}$$

$$\mathbf{P}^\top = \begin{pmatrix} -6 & 8 \end{pmatrix}$$

From (1), we have

$$\mathbf{P}^\top \mathbf{P} = \begin{pmatrix} -6 & 8 \end{pmatrix} \begin{pmatrix} -6 \\ 8 \end{pmatrix} \tag{2}$$

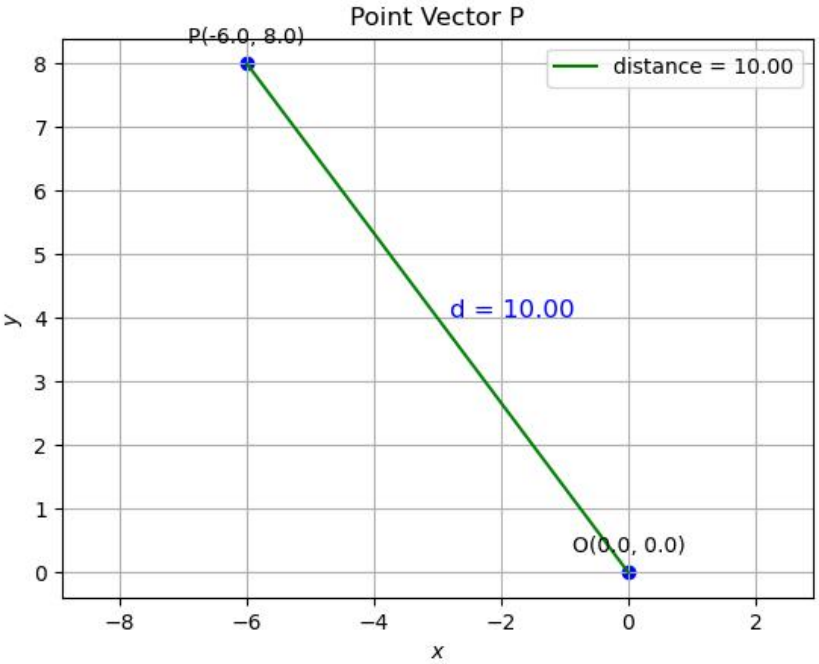
$$= (-6)(-6) + (8)(8) \tag{3}$$

$$= 36 + 64 \tag{4}$$

$$= 100 \tag{5}$$

$$\text{Distance} = \|\mathbf{P}\| = \sqrt{\mathbf{P}^\top \mathbf{P}} = \sqrt{100} = 10$$

$\therefore$ The distance of the point $(-6, 8)$ from the origin is **10 units**.


Point Vector P
P(-6.0, 8.0)
distance = 10.00
d = 10.00
O(0.0, 0.0)
y
x
8
7
6
5
4
3
2
1
0
−8
−6
−4
−2
0
2

Point $P(-6, 8)$