1.9.34

Puni Aditya - EE25BTECH11046

22nd August, 2025

Question

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

Equation

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

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

Theoretical Solution

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

From 1, we have

$$\begin{aligned} \mathbf{P}^\top \mathbf{P} &= \begin{pmatrix} -6 & 8 \end{pmatrix} \begin{pmatrix} -6 \\ 8 \end{pmatrix} && (2) \\ &= (-6)(-6) + (8)(8) && (3) \\ &= 36 + 64 && (4) \\ &= 100 && (5) \end{aligned}$$

Theoretical Solution

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

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

Plot

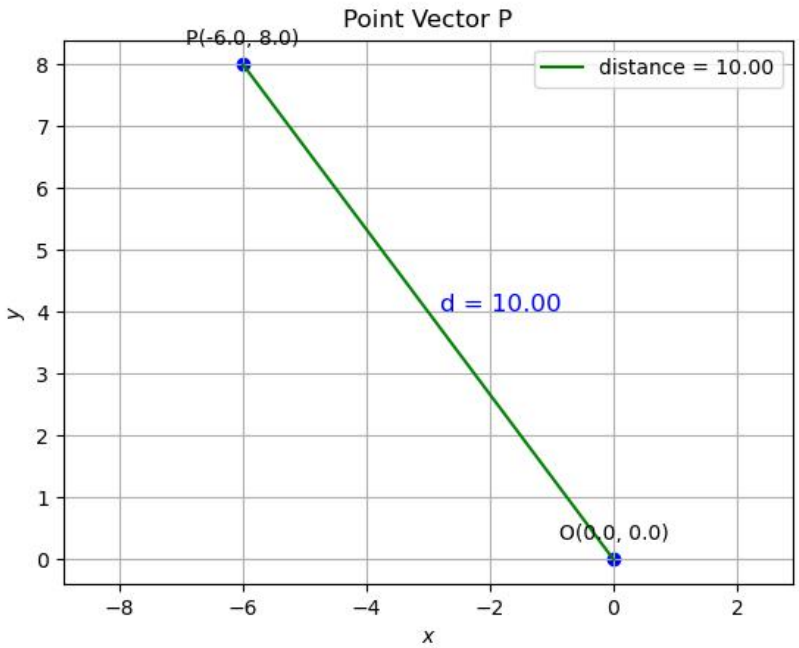

Figure: Point P$(-6, 8)$