

1.9.34

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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

$$\|\mathbf{P}\| = \sqrt{\mathbf{P}^T \mathbf{P}} \quad (1)$$

Theoretical Solution

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

From (1), we have

$$\mathbf{P}^T \mathbf{P} = \begin{pmatrix} -6 & 8 \end{pmatrix} \begin{pmatrix} -6 \\ 8 \end{pmatrix} \quad (2)$$

$$= (-6)(-6) + (8)(8) \quad (3)$$

$$= 36 + 64 \quad (4)$$

$$= 100 \quad (5)$$

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

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

Plot

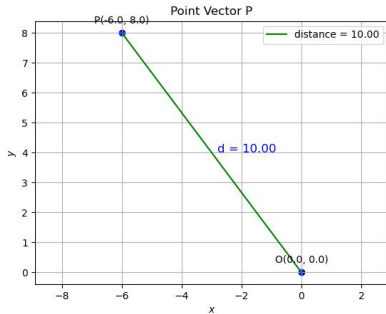


Figure: Point $P(-6, 8)$