

give me a exercise for finding a angles between two vector

To find the angle between two vectors, you can use the dot product formula. Here's a step-by-step exercise to practice this concept.

Exercise: Finding the Angle Between Two Vectors

Given Vectors:

Let vector

$$\mathbf{u} = (3, 4)$$

and vector

$$\mathbf{v} = (1, 2)$$

Steps to Calculate the Angle:

1. Calculate the Dot Product:

The dot product

$$\mathbf{u} \cdot \mathbf{v}$$

is calculated as follows:

$$\mathbf{u} \cdot \mathbf{v} = u_1v_1 + u_2v_2$$

For our vectors:

$$\mathbf{u} \cdot \mathbf{v} = (3)(1) + (4)(2) = 3 + 8 = 11$$

2. Calculate the Magnitudes of Each Vector:

The magnitude of vector

$$\mathbf{u}$$

:

$$|\mathbf{u}| = \sqrt{u_1^2 + u_2^2} = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = 5$$

The magnitude of vector

$$\mathbf{v}$$

:

$$|\mathbf{v}| = \sqrt{v_1^2 + v_2^2} = \sqrt{1^2 + 2^2} = \sqrt{1 + 4} = \sqrt{5}$$

3. Use the Dot Product to Find the Cosine of the Angle:

The formula relating the dot product and the angle

$$\theta$$

between two vectors is:

$$\cos(\theta) = \frac{\mathbf{u} \cdot \mathbf{v}}{|\mathbf{u}||\mathbf{v}|}$$

Substitute in the values:

$$\cos(\theta) = \frac{11}{5\sqrt{5}}$$

4. Calculate the Angle:

To find

$$\theta$$

, take the arccosine:

$$\theta = \cos^{-1} \left(\frac{11}{5\sqrt{5}} \right)$$

5. Final Calculation:

Use a calculator to compute

$$\theta$$

. Ensure your calculator is set to the correct mode (degrees or radians as needed).

This exercise will help you understand how to find the angle between two vectors using their dot product and magnitudes.

