



## Practice with 3-Space Vectors

Please choose the best answer to each of the following questions.

1. Find the cross product of  $\vec{v} \times \vec{u}$ .  $\vec{v} = \langle 3, -4, 1 \rangle$

$$\vec{u} = \langle -1, 2, 0 \rangle$$

$$\langle -2, 1, 10 \rangle$$

$$\langle -2, 1, 2 \rangle$$

$$\langle -2, 4, 10 \rangle$$

$$\langle -6, 1, 2 \rangle$$

2. Find the direction of vector  $\langle 3, -4, 1 \rangle$

$$\varphi = -79.5 \text{ degrees} \quad \theta = 11.3 \text{ degrees}$$

$$\varphi = -53.1 \text{ degrees} \quad \theta = 78.7 \text{ degrees}$$

$$\varphi = -53.1 \text{ degrees} \quad \theta = 11.3 \text{ degrees}$$

$$\varphi = 79.5 \text{ degrees} \quad \theta = -36.9 \text{ degrees}$$

3. Find the dot product  $\vec{v} \cdot \vec{u}$ .  $\vec{v} = \langle 3, -4, 1 \rangle$

$$\vec{u} = \langle -1, 2, 0 \rangle$$

$$11$$

$$-5$$

$$5$$

$$24$$

4. Find the angle between the vectors  $\vec{v} = \langle -1, 2, 0 \rangle$

$$\vec{u} = \langle 7, 8, 4 \rangle$$

$$\theta = \cos^{-1} \left( \frac{9}{\sqrt{645}} \right)$$

$$\theta = \cos^{-1} \left( \frac{23}{\sqrt{645}} \right)$$

$$\theta = \cos^{-1} \left( \frac{9}{\sqrt{134}} \right)$$

$$\theta = \cos^{-1} \left( \frac{23}{\sqrt{134}} \right)$$

5. Calculate the magnitude of the cross product

$$\|\vec{v} \times \vec{u}\| \text{ if } \vec{v} = \langle 4, 2, -3 \rangle \vec{u} = \langle 1, 2, 7 \rangle$$

29.8

30.1

37.4

45.0

6. The magnitude of a cross product is represented by what geometric figure?

A scalene triangle

A right triangle

A parallelogram

7. If  $\vec{v} = \langle 3, 2, 7 \rangle$  find  $-5\vec{v}$

$\langle -15, -10, -35 \rangle$

$\langle -15, -10, -12 \rangle$

$\langle -2, -3, 2 \rangle$

$\langle -8, -10, -12 \rangle$

8. What is the dot product for the following vectors?

$\langle a, b, c \rangle \cdot \langle x, y, z \rangle$

$ax + by + cz$

$ax - by - cz$

$abc + xyz$

$abc - xyz$

9. Find  $\vec{a} - \vec{b}$  if  $\vec{a} = \langle 1, 4, 7 \rangle$   $\vec{b} = \langle 12, 0, -3 \rangle$

$\langle -11, 4, 14 \rangle$

$\langle -11, 4, 20 \rangle$

$\langle -11, 0, 14 \rangle$

$\langle -11, 0, 20 \rangle$

10. In 3-space, how are the axes related?

The z-axis is parallel to the xy-plane

The x-axis is parallel to the yz-plane

The z-axis is perpendicular to the xy-plane

The x-axis is perpendicular to the yz-plane