- 1. Which is always true about the dot product of two vectors?
 - A. It is zero.
 - C. It is a scalar.

- B. It is a vector.
- D. None of these.

2. Suppose that \vec{u} and \vec{v} are vectors. Using the same choices as for the previous exercise, which is true about $\vec{u} \times \vec{v}$?

- 3. The vectors $\vec{\mathbf{u}} = \langle 3, 1, 7 \rangle$ and $\vec{\mathbf{v}} = \langle -5, 4, 2 \rangle$ are perpendicular.
 - A. true B. false

4. Let
$$\vec{\mathbf{w}} = \vec{\mathbf{u}} \times \vec{\mathbf{v}}$$
. Then $\vec{\mathbf{u}} \cdot \vec{\mathbf{w}}$ is

- A. perpendicular to \vec{u} .
- B. perpendicular to \vec{v} .
- C. perpendicular to $\vec{\mathbf{w}}$.
- D. none of these.

- 5. Which of the following operations is *NOT* meaningful? (That is, which is not defined?)
 - A. subtracting two vectors
 - B. adding a scalar and a vector
 - C. multiplying a scalar by a vector
 - D. none of the above

6. Let $\vec{\mathbf{w}} = \vec{\mathbf{u}} \times \vec{\mathbf{v}}$. Which of the following is NOT true? A. $\vec{\mathbf{w}} \perp \vec{\mathbf{u}}$ B. $\vec{\mathbf{w}} \perp \vec{\mathbf{v}}$ C. $\vec{\mathbf{w}} \cdot \vec{\mathbf{u}} = 0$ D. none of these (that is, all of them ARE true) 7. The vectors \vec{u} and \vec{v} are shown to the right. For which of the diagrams below does \vec{w} represent $\vec{u} - \vec{v}$? A. \vec{w} \vec{w} \vec{w} \vec{w} \vec{w} \vec{w} \vec{w} \vec{w} \vec{w} 8. Which vector $\vec{\mathbf{u}}$ represents $\operatorname{proj}_{\vec{\mathbf{b}}} \vec{\mathbf{v}}$?









- 9. A plane contains three points P_1 , P_2 , P_3 . Which vector is perpendicular to the plane?
 - A. $\overrightarrow{P_1P_2} \times \overrightarrow{P_2P_3}$ B. $\overrightarrow{P_1P_2} \cdot \overrightarrow{P_1P_3}$ C. $\overrightarrow{P_1P_2}$ D. none of these

- 10. Which parametric equations describe the line through (1,2,3) and (-2,5,4)?
 - A. x = 1 2t, y = 2 + 5t, z = 4 + 3tB. x = -2 + t, y = 5 + 2t, z = 3 + 4tC. x = -2 + 3t, y = 5 - 3t, z = 4 - tD. x = 1 - 3t, y = 2 + 3t, z = 3 + t

11. A line in 2-space has the equations x = 3+t, y = 2-5t. Which of the following is *NOT* a representation of the same line?

A.
$$x = 3 - t$$
, $y = 2 + 5t$
B. $x = 3 + 2t$, $y = 2 - 10t$
C. $x = 6 + t$, $y = 4 - 5t$
D. $y = -5x + 17$

- 12. Which of the following is the equation of a plane that is perpendicular to the plane with equation x + y + z = 3?
 - A. x + 2y 3z = 5 B. 2x + 2y + 2z = 6
 - C. x + 2y + 3z = -2 D. none of these

13. Using the same choices as in Exercise 1, which equation represents a plane that is parallel to the plane with equation x + y + z = 3?

Answers:

- 1. C
- 2. B
- 3. B
- 4. D
- 5. B
- 6. D
- 7. B
- 8. C
- 9. A
- 10. D
- 11. C
- 12. A
- 13. D