## Congratulations! You passed!

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**1. Given the vectors:** 1 / 1 point

$\vec{v}$= (1, 0, 7)

$\vec{w}$= (0, -1, 2)

**find the distance between them,** $d(\vec{v}, \vec{w})$.

- ○ $5$
- ○ $-2$
- ○ $\sqrt{(23)}$
- ◉ $\sqrt{(27)}$

Correct
Correct! $d(\vec{v}, \vec{w}) = \sqrt{(0-1)^2 + (-1-0)^2 + (2-7)^2}$

**2. You are given the points *P*: (1, 0, -3) and *Q*: (−1,0,-3). The magnitude of the vector from *P* to *Q* is:** 1 / 1 point

- ◉ 2
- ○ 3
- ○ -2

Correct
Correct! The magnitude of the vector is the distance between points P and Q, which you find by using the following: $\sqrt{((-1)-1)^2 + 0^2 + ((-3)-(-3))} = \sqrt{4} = 2$

**3. Select the correct statements pertaining to the dot product.** 0.5 / 1 point

- ☑ The dot product of orthogonal vectors is always 0.

Correct
Correct! Since both vectors are perpendicular to each other, the dot product is always 0.

- ☐ The dot product of orthogonal vectors is always 1.
- ☑ The dot product vector is the diagonal in a parallelogram formed by the two vectors $\vec{u}$ and $\vec{v}$.

This should not be selected
Not quite. This is the sum of two vectors.

- ☐ The dot product of two vectors is always a scalar.

**4. Calculate the norm $\|v\|$ of the vector $\vec{v}$ = (1, -5, 2, 0,-3 ) and select the correct answer.** 1 / 1 point

- ○ $\|v\| = 5$
- ○ $\|v\| = \sqrt{35}$
- ○ $\|v\| = 39$
- ◉ $\|v\| = \sqrt{39}$

Correct
Correct! $\|v\| = \sqrt{((1^2) + (-5)^2 + 2^2 + 0^2 + (-3)^2)} = \sqrt{39}$

**5. Which of the vectors has the greatest norm?** 1 / 1 point

- ○ $\begin{bmatrix} 1 \\ 0 \\ -2 \\ 0 \\ -1 \end{bmatrix}$
- ◉ $\begin{bmatrix} 2 \\ 5 \end{bmatrix}$

- $\begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}$
- $\begin{bmatrix} 2 \\ 2 \\ 2 \\ 2 \end{bmatrix}$
- $\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$

**Correct**

Correct! The norm of the vector is $\sqrt{(2^2) + (5^2)} = \sqrt{29}$ which is larger than the other vectors in the options given.

**6. Calculate the dot product $\vec{a} \cdot \vec{b}$ and select the correct answer.** 1 / 1 point

$$\vec{a} = \begin{bmatrix} -1 \\ 5 \\ 2 \end{bmatrix}, \vec{b} = \begin{bmatrix} -3 \\ 6 \\ -4 \end{bmatrix}$$

- 30
- $\begin{bmatrix} -3 \\ 30 \\ -8 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$
- 25

**Correct**

Correct! By applying the formula you saw in the video The dot product as follows: $\vec{a} \cdot \vec{b} = ax \cdot bx + ay \cdot by + az \cdot bz$, you have:

$$\vec{a} \cdot \vec{b} = (-1) \cdot (-3) + 5 \cdot 6 + 2 \cdot (-4) = 3 + 30 - 8 = 25.$$

**7. Which of the following is the result of performing the multiplication $M_1 \cdot M_2$? Where $M_1$ and $M_2$ are given by:** 1 / 1 point

$$M_1 = \begin{bmatrix} 2 & -1 \\ 3 & -3 \end{bmatrix}, M_2 = \begin{bmatrix} 5 & -2 \\ 0 & 1 \end{bmatrix}.$$

- $\begin{bmatrix} 10 & -5 \\ 15 & -9 \end{bmatrix}$
- $\begin{bmatrix} 10 & -3 & 1 \\ 15 & -4 & 0 \\ 1 & 0 & 1 \end{bmatrix}$
- $\begin{bmatrix} 10 & 3 \\ 15 & 4 \end{bmatrix}$
- $\begin{bmatrix} 10 & 15 \\ -3 & -4 \end{bmatrix}$

**Correct**

Correct! Remember from the video Matrix Multiplication, to multiply matrices, you have: $\begin{bmatrix} c_1 & c_2 \\ c_3 & c_4 \end{bmatrix}$ where in the matrices given:

$$c_1 = 2 \cdot 5 + (-1) \cdot 0 = 10,$$

$$c_2 = 2 \cdot (-2) + (-1) \cdot 1 = -5,$$

$$c_3 = 3 \cdot 5 + (-3) \cdot 0 = 15,$$

$$c_4 = 3 \cdot (-2) + (-3) \cdot 1 = -9.$$

When you replace these values back onto the matrix, you obtain: $\begin{bmatrix} 10 & -5 \\ 15 & -9 \end{bmatrix}$.

**8. Calculate the dot product $\vec{w} \cdot \vec{z}$ and select the correct answer.** 1 / 1 point

$$\vec{w} = \begin{bmatrix} -9 \\ -1 \end{bmatrix}, \vec{z} = \begin{bmatrix} -3 \\ -5 \end{bmatrix}$$

- $\begin{bmatrix} 27 \\ 5 \end{bmatrix}$

$\begin{bmatrix} 0 \end{bmatrix}$

- 35
- $\begin{bmatrix} -27 \\ -5 \end{bmatrix}$
- 32

**Correct**

Correct! $\vec{w} \cdot \vec{z} = \begin{bmatrix} -9 \\ -1 \end{bmatrix} \cdot \begin{bmatrix} -3 \\ -5 \end{bmatrix} = (-9)(-3) + (-1)(-5) = 32$