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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, $d(\vec{v}, \vec{w})$.

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

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
- (●) 2
- ( ) 3

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. 1 / 1 point

- [x] 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.
- [x] The dot product of two vectors is always a scalar.

Correct
Correct! The dot product gives us a real number, therfore a scalar.

- [ ] The dot product vector is the diagonal in a parallelogram formed by the two vectors $\vec{u}$ and $\vec{v}$.

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

- (●) $\|v\| = \sqrt{39}$
- ( ) $\|v\| = 39$
- ( ) $\|v\| = \sqrt{35}$
- ( ) $\|v\| = 5$

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

- ( ) $\begin{bmatrix} 2 \\ 2 \\ 2 \\ 2 \end{bmatrix}$
- ( ) $\begin{bmatrix} 1 \\ 0 \\ -2 \\ 0 \\ -1 \end{bmatrix}$
- (●) $\begin{bmatrix} 2 \\ 5 \end{bmatrix}$
- ( ) $\begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}$
- ( ) $\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$

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

$$\vec{a} = \begin{bmatrix} 3 \\ 7 \\ 1 \end{bmatrix}, \vec{b} = \begin{bmatrix} 4 \\ 0 \\ 3 \end{bmatrix}$$

- ( ) $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$
- ( ) 30
- (●) 15
- ( ) $\begin{bmatrix} 12 \\ 0 \\ 3 \end{bmatrix}$

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:

$\vec{a} \cdot \vec{b} = 3 \cdot 4 + 7 \cdot 0 + 1 \cdot 3 = 12 + 0 + 3 = 15.$

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

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

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

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

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

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

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