

✔ Congratulations! You passed!

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1. Given the vectors:

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

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

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

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

✔ Correct

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

1 / 1 point

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:

- ☐ -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:  $\sqrt{((-1)-1)^2 + 0^2 + ((-3)-(-3))^2} = \sqrt{4} = 2$

1 / 1 point

3. Select the correct statements pertaining to the dot product.

☒ 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 two vectors is always a scalar.

✔ Correct

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

☐ 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  $\vec{v}$ .

1 / 1 point

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

- ☒  $\|\vec{v}\| = \sqrt{39}$
- ☐  $\|\vec{v}\| = 39$
- ☐  $\|\vec{v}\| = 5$
- ☐  $\|\vec{v}\| = \sqrt{35}$

✔ Correct

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

1 / 1 point

5. Which of the vectors has the greatest norm?

- ☐  $\begin{bmatrix} 2 \\ 2 \\ 2 \\ 2 \end{bmatrix}$
- ☐  $\begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}$
- ☐  $\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$
- ☒  $\begin{bmatrix} 2 \\ 5 \end{bmatrix}$
- ☐  $\begin{bmatrix} 1 \\ 0 \\ -2 \\ 0 \\ -1 \end{bmatrix}$

✔ 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.

1 / 1 point

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

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

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

✔ Correct

Correct! By applying the formula you saw in the video [The dot product](#), <sup>12</sup> as follows:

$\vec{a} \cdot \vec{b} = ax \cdot bx + ay \cdot by + az \cdot bz$ , you have:

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

1 / 1 point

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:

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

- ☐  $\begin{bmatrix} 10 & 15 \\ -3 & -4 \end{bmatrix}$
- ☐  $\begin{bmatrix} 10 & 3 \\ 15 & 4 \end{bmatrix}$
- ☐ -

1 / 1 point

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

✔ Correct

Correct! Remember from the video [Matrix Multiplication 15](#), 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

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

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

✔ Correct

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