

# Dot product of vectors

Practice Quiz, 5 questions

5/5 points (100.00%)



## Congratulations! You passed!

Next Item



1 / 1  
point

1. As we have seen in the lecture videos, the dot product of vectors has a lot of applications. Here, you will complete some exercises involving the dot product.

What is the size of the vector  $\begin{bmatrix} 1 \\ 3 \\ 4 \\ 2 \end{bmatrix}$ ?



$\sqrt{30}$

**Correct**

The size of the vector is the square root of the sum of the squares of the components.



10



$\sqrt{10}$



30



1 / 1  
point

2.

What is the dot product of the vectors

$$\begin{bmatrix} -5 \\ 3 \\ 2 \\ 8 \end{bmatrix}$$

and  $\begin{bmatrix} 1 \\ 2 \\ -1 \\ 0 \end{bmatrix}$ ?

☐  $\begin{bmatrix} -4 \\ 5 \\ 1 \\ 9 \end{bmatrix}$

☐ 1

☐  $\begin{bmatrix} -5 \\ 6 \\ -2 \\ 0 \end{bmatrix}$

☒ -1

**Correct**

The dot product of two vectors is the total of the component-wise products.



1 / 1  
point

3.

Let  $\mathbf{r} = \begin{bmatrix} 3 \\ -4 \\ 0 \end{bmatrix}$  and let  $\mathbf{s} = \begin{bmatrix} 10 \\ 5 \\ -6 \end{bmatrix}$ .

What is the scalar projection of  $\mathbf{s}$  onto  $\mathbf{r}$ ?

☐  $\frac{1}{2}$

☐ -2

☐  $-\frac{1}{2}$

☒ 2

**Correct**

The scalar projection of  $\mathbf{s}$  onto  $\mathbf{r}$  can be calculated with the formula  $\frac{\mathbf{r} \cdot \mathbf{s}}{|\mathbf{r}|}$

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1 / 1  
point

4. Let  $\mathbf{r} = \begin{bmatrix} 3 \\ -4 \\ 0 \end{bmatrix}$  and let  $\mathbf{s} = \begin{bmatrix} 10 \\ 5 \\ -6 \end{bmatrix}$ .

What is the vector projection of  $\mathbf{s}$  onto  $\mathbf{r}$ ?

☐  $\begin{bmatrix} 6 \\ -8 \\ 0 \end{bmatrix}$

☐  $\begin{bmatrix} 30 \\ -20 \\ 0 \end{bmatrix}$

☐  $\begin{bmatrix} 6 \\ 4 \\ 0 \end{bmatrix}$

☒  $\begin{bmatrix} 6/5 \\ -8/5 \\ 0 \end{bmatrix}$



**Correct**

The vector projection of  $\mathbf{s}$  onto  $\mathbf{r}$  can be calculated with the formula  $\frac{\mathbf{r} \cdot \mathbf{s}}{\mathbf{r} \cdot \mathbf{r}} \mathbf{r}$ .

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1 / 1  
point

5. Given Let  $\mathbf{a} = \begin{bmatrix} 3 \\ 0 \\ 4 \end{bmatrix}$  and let  $\mathbf{b} = \begin{bmatrix} 0 \\ 5 \\ 12 \end{bmatrix}$ .

Which is larger,  $|\mathbf{a} + \mathbf{b}|$  or  $|\mathbf{a}| + |\mathbf{b}|$ ?

☐  $|\mathbf{a} + \mathbf{b}| = |\mathbf{a}| + |\mathbf{b}|$

☐  $|\mathbf{a} + \mathbf{b}| \geq |\mathbf{a}| + |\mathbf{b}|$



$$|\mathbf{a} + \mathbf{b}| \leq |\mathbf{a}| + |\mathbf{b}|$$



**Correct**

This is in general true for any **a** or **b**. This is called the "triangle inequality".

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