Dot product of vectors

Practice Quiz, 5 questions

5/5 points (100%)

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 $\begin{bmatrix} 1 \\ 3 \\ 4 \\ 2 \end{bmatrix}$?

- 30
- $\sqrt{10}$
- 10
- $\sqrt{30}$

Correct

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

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
- -1

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

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

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

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1 / 1 point

4.

5/5 points (100%)

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 $\mathbf{r}$?

- $\begin{bmatrix} 30 \\ -20 \\ 0 \end{bmatrix}$
- $\begin{bmatrix} 6 \\ 4 \\ 0 \end{bmatrix}$
- ✓ $\begin{bmatrix} 6/5 \\ -8/5 \\ 0 \end{bmatrix}$

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

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

✓ 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 $|\mathbf{a}| + |\mathbf{b}|$?

- $|\mathbf{a} + \mathbf{b}| \geq |\mathbf{a}| + |\mathbf{b}|$
- ✓ $|\mathbf{a} + \mathbf{b}| \leq |\mathbf{a}| + |\mathbf{b}|$

Correct
This is in general true for any $\mathbf{a}$ or $\mathbf{b}$. This is called the "triangle inequality".

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

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