Dot product of vectors
Practice Quiz • 15 min

Introduction

- **Video:** Introduction to module 2 - Vectors
  49 sec

Finding the size of a vector, its angle, and projection

- **Video:** Modulus & inner product
  10 min
- **Video:** Cosine & dot product
  5 min
- **Video:** Projection
  6 min
- **Practice Quiz:** Dot product of vectors
  6 questions

Changing the reference frame

- **Video:** Changing basis
  11 min
- **Practice Quiz:** Changing basis
  5 questions
- **Video:** Basis, vector space, and linear independence
  4 min
- **Video:** Applications of changing basis
  3 min
- **Practice Quiz:** Linear dependency of a set of vectors
  6 questions

Doing some real-world vectors examples

- **Quiz:** Vector operations assessment
  5 questions
- **Video:** Summary
  1 min

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TO PASS 80% or higher

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GRADE
100%

PRACTICE QUIZ • 15 MIN

Dot product of vectors

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TOTAL POINTS 6

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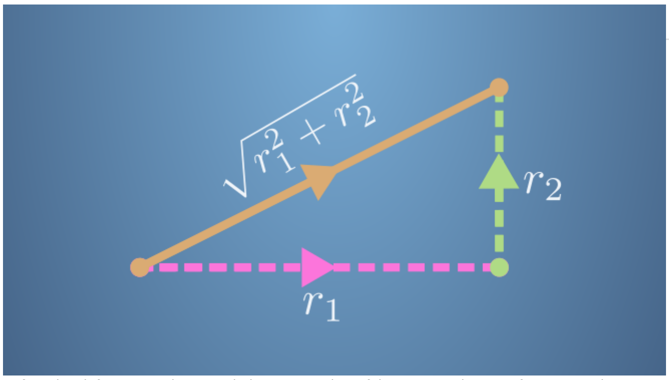
1. As we have seen in the lecture videos, the dot product of vectors has a lot of applications. Here, you will complete some exercises involving the dot product. **1 / 1 point**

We have seen that the size of a vector with two components is calculated using Pythagoras' theorem, for example the following diagram shows how we calculate the size of the orange vector $\mathbf{r} = \begin{bmatrix} r_1 \\ r_2 \end{bmatrix}$:



In fact, this definition can be extended to any number of dimensions; the size of a vector is the square root of the sum of the squares of its components. Using this information, what is the size of the vector $\mathbf{s} = \begin{bmatrix} 1 \\ 3 \\ 4 \\ 2 \end{bmatrix}$?

- ○ $|\mathbf{s}| = 10$
- ◉ $|\mathbf{s}| = \sqrt{30}$
- ○ $|\mathbf{s}| = \sqrt{10}$
- ○ $|\mathbf{s}| = 30$

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

2. Remember the definition of the dot product from the videos. For two n component vectors, $\mathbf{a} \cdot \mathbf{b} = a_1b_1 + a_2b_2 + \cdots + a_nb_n$. **1 / 1 point**

What is the dot product of the vectors $\mathbf{r} = \begin{bmatrix} -5 \\ 3 \\ 2 \\ 8 \end{bmatrix}$ and $\mathbf{s} = \begin{bmatrix} 1 \\ 2 \\ -1 \\ 0 \end{bmatrix}$?

- ○ $\mathbf{r} \cdot \mathbf{s} = \begin{bmatrix} -5 \\ 6 \\ -2 \\ 0 \end{bmatrix}$
- ○ $\mathbf{r} \cdot \mathbf{s} = \begin{bmatrix} -4 \\ 5 \\ 1 \\ 9 \end{bmatrix}$
- ◉ $\mathbf{r} \cdot \mathbf{s} = -1$
- ○ $\mathbf{r} \cdot \mathbf{s} = 1$

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

3. The lectures introduced the idea of projecting one vector onto another. The following diagram shows the projection of $\mathbf{s}$ onto $\mathbf{r}$ when the vectors are in two dimensions: **1 / 1 point**