Vector operations assessment | Coursera

Vector operations assessment

Graded Quiz • 15 min

Due Mar 22, 2:59 AM EDT

Congratulations! You passed!

TO PASS 80% or higher

GRADE

100%

Vector operations assessment

LATEST SUBMISSION GRADE

100%

1.

Question 1

In this assessment, you will be tested on all of the different topics you have in covered this module. Good luck!

A ship travels with velocity given by

$$\begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$\begin{bmatrix} 1 \\ 2 \end{bmatrix}$, with current flowing in the direction given by $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ with respect to some co-ordinate axes.

What is the velocity of the ship in the direction of the current?

1 / 1 point

$\begin{bmatrix} 3/2 \\ 2/3 \end{bmatrix}$

3/2
[2/3]

$\begin{bmatrix} 3/2 \\ 3/2 \end{bmatrix}$

3/2
[3/2]

$\begin{bmatrix} 2/3 \\ 2/3 \end{bmatrix}$

2/3
[2/3]

$\begin{bmatrix} 2/3 \\ 3/2 \end{bmatrix}$

2/3
[3/2]

Correct

This is the vector projection of the velocity of the ship onto the velocity of the current.

2.

Question 2

A ball travels with velocity given by

$$\begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

$\begin{bmatrix} 2 \\ 1 \end{bmatrix}$, with wind blowing in the direction given by $\begin{bmatrix} 3 \\ -4 \end{bmatrix}$ with respect to some co-ordinate axes.

What is the size of the velocity of the ball in the direction of the wind?

1 / 1 point

- (●) $\frac{2}{5}$
- ( ) $-\frac{5}{2}$
- ( ) $\frac{5}{2}$
- ( ) $-\frac{2}{5}$

✓ **Correct**

This is the scalar projection of the velocity of the ball onto the velocity of the wind.

3.

Question 3

Given vectors

$$\begin{bmatrix} -4 \\ -3 \\ 8 \end{bmatrix}$$

$\mathbf{v} = \begin{bmatrix} -4 \\ -3 \\ 8 \end{bmatrix}$, $\mathbf{b_1} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, $\mathbf{b_2} = \begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix}$ and $\mathbf{b_3} = \begin{bmatrix} -3 \\ -6 \\ 5 \end{bmatrix}$ all written in the standard basis,

what is $\mathbf{v}$ in the basis defined by $\mathbf{b_1}$, $\mathbf{b_2}$ and $\mathbf{b_3}$? You are given that $\mathbf{b_1}$, $\mathbf{b_2}$ and $\mathbf{b_3}$ are all pairwise orthogonal to each other.

1 / 1 point

- $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$

$\begin{bmatrix} \mathbf{1} \\ \mathbf{1} \\ \mathbf{1} \end{bmatrix}$

- $\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$

$\begin{bmatrix} \mathbf{0} \\ \mathbf{1} \\ \mathbf{1} \end{bmatrix}$

$\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$

$\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$

$\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$

$\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$

Correct

This is a change of basis in 3 dimensions.

4.

Question 4

Are the following vectors linearly independent?

$$\begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$$

$\mathbf{a} = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$, $\mathbf{b} = \begin{bmatrix} 3 \\ -4 \\ 5 \end{bmatrix}$ and $\mathbf{c} = \begin{bmatrix} 1 \\ -8 \\ 7 \end{bmatrix}$.

1 / 1 point

- Yes
- No

Correct

One can be written as a linear combination of the other two.

5.

Question 5

At 12:00 pm, a spaceship is at position

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

km $\begin{bmatrix} 3 \\ 2 \\ 4 \end{bmatrix}$ *km* away from the origin with respect to some 3 dimensional co ordinate system.

The ship is travelling with velocity $\begin{bmatrix} -1 \\ 2 \\ -3 \end{bmatrix}$ *km*/*h* What is the location of the spaceship

after 2 hours have passed?

1 / 1 point

- $\begin{bmatrix} 2 \\ 4 \\ 1 \end{bmatrix}$
- $\begin{bmatrix} 2 \\ 4 \\ 1 \end{bmatrix}$

$$\begin{bmatrix} -2 \\ 4 \\ -1 \end{bmatrix}$$

$$\begin{bmatrix} -2 \\ 4 \\ -1 \end{bmatrix}$$

$$\begin{bmatrix} -1 \\ -6 \\ 2 \end{bmatrix}$$

$$\begin{bmatrix} -1 \\ -6 \\ 2 \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 6 \\ -2 \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 6 \\ -2 \end{bmatrix}$$

Correct

This takes the idea of vectors in the context of a moving body.