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1. Vectors

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Problem Set A due Aug 18, 2021 20:30 IST Completed

2A-1

5.0/5 points (graded)

Find the magnitude of the vector $\langle 3, 4 \rangle$.

$|\langle 3, 4 \rangle| =$ 5 ✔

Find a vector which is in the same direction as $\langle 3, 4 \rangle$ and has length 10.

(Enter the vector in the form `[a,b]`. That is surround your vector by square brackets, and separate entries by a comma. Note that the entries of your vector must be numbers.)

[6,8] ✔

Find a vector which is in the same direction as $\langle 3, 4 \rangle$ and has length 1.

(Enter the vector in the form `[a,b]`. That is surround your vector by square brackets, and separate entries by a comma. Note that the entries of your vector must be numbers.)

[3/5,4/5] ✔

If the vector $\langle a, 6 \rangle$ points in the same direction as $\langle 3, 4 \rangle$, then what is a?

$a =$ 9/2 ✔

Which of the following are perpendicular to $\langle 3, 4 \rangle$. (Choose all that apply.)

- [x] $\langle 4, -3 \rangle$
- [x] $\langle -1/2, 3/8 \rangle$
- [ ] $\langle 4, 3 \rangle$
- [ ] $\langle -1/4, -1/3 \rangle$
- [x] $\langle 1, -3/4 \rangle$

✔

Submit You have used 1 of 5 attempts

2A-2

6.0/6 points (graded)

In this problem, we will practice vector properties in other notation.

Find the magnitude and direction of the vectors. Enter the magnitude as a positive real number, the direction as a unit vector.

(Enter vectors surrounded by square brackets, and with commas separating entries; e

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(Enter vectors surrounded by square brackets, and with commas separating entries, e.g. `[0,1]` or `[3,4]`.)

Vector $\vec{v}$	Magnitude $\lvert\vec{v}\rvert$	Direction $\hat{v}$
$\hat{i}+\hat{j}$	sqrt(2) ✔ **Answer:** sqrt(2)	[1/sqrt(2),1/sqrt(2)] ✔ **Answer:** (1/sqrt(2))*[1,1]
$2\hat{i}-\hat{j}$	sqrt(5) ✔ **Answer:** sqrt(5)	[2/sqrt(5),-1/sqrt(5)] ✔ **Answer:** (1/sqrt(5))*[2,-1]
$3\hat{i}-6\hat{j}$	3*sqrt(5) ✔ **Answer:** 3*sqrt(5)	[1/sqrt(5),-2/sqrt(5)] ✔ **Answer:** 1/(sqrt(5))*[1,-2]

? INPUT HELP

Solution:

Vector $\vec{v}$	Magnitude $\lvert\vec{v}\rvert$	Direction $\hat{v}$
$\hat{i}+\hat{j}$	$\lvert\hat{i}+\hat{j}\rvert=\sqrt{1^2+1^2}=\sqrt{2}$	$\frac{\hat{i}+\hat{j}}{\lvert\hat{i}+\hat{j}\rvert}=\frac{\hat{i}+\hat{j}}{\sqrt{2}}$
$2\hat{i}-\hat{j}$	$\lvert2\hat{i}-\hat{j}\rvert=\sqrt{2^2+1}=\sqrt{5}$	$\frac{2\hat{i}-\hat{j}}{\lvert2\hat{i}-\hat{j}\rvert}=\frac{2\hat{i}-\hat{j}}{\sqrt{5}}$
$3\hat{i}-6\hat{j}$	$\lvert3\hat{i}-6\hat{j}\rvert=3\lvert\hat{i}-2\hat{j}\rvert=3\sqrt{1^2+2^2}=3\sqrt{5}$	$\frac{3\hat{i}-6\hat{j}}{\lvert3\hat{i}-6\hat{j}\rvert}=\frac{\hat{i}-2\hat{j}}{\sqrt{5}}$

Submit You have used 1 of 5 attempts

Answers are displayed within the problem

2A-3

1.0/1 point (graded)

For what value(s) of c will $\frac{1}{5}\hat{i}+c\hat{j}$ be a unit vector?

(If there is more than one value, separate by commas; e.g. `0,1`.)

2*sqrt(6)/5,-2*sqrt(6)/5 ✔ **Answer:** 2*sqrt(6)/5, -2*sqrt(6)/5

? INPUT HELP

Solution:

Note that we do expect there to be two answers, depending on the sign of the component of the vector pointing along the y axis.

The magnitude of the vector is given by $\sqrt{\frac{1}{5^2}+c^2}=1$. Solving for c we find

$$\sqrt{\frac{1}{25}+c^2} = 1 \tag{3.123}$$

$$\frac{1}{25}+c^2 = 1 \tag{3.124}$$

$$c^2 = \frac{24}{25} \tag{3.125}$$

$$c = \pm\frac{\sqrt{24}}{\_}$$

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5

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Answers are displayed within the problem

1. Vectors

Topic: Unit 2: Geometry of Derivatives / 1. Vectors

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? STAFF 2A-2 how to express unit vectors? 2
1. The grader accepts numerical vectors but I expected, by the form of the question that the answers should be in terms of i hat and ...

2A-2 3
don't be like me and take forever to realize that i & j are the unit vectors

Extension 2
Dear staff, I am having some time issues and would very much appreciate a couple day extension for problem set 2. Thank you for y...

[Staff] Typo in 2A-1 2
Magnitude is misspelled.

? 2A-2 2
How many digits after the decimal for the grader to mark it correct.

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