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MATH-211-2: Adv Calculus (Multivariable) - Spring 2023, Spring 2023

Homework1-12.1-12.3 (Homework)

 INSTRUCTOR

Sima Ahsani

Emory University, GA

Current Score

QUESTION

1

2

3

4

5

6

7

8

9

10

POINTS

2/2

2/2

2/2

2/2

2/2

2/2

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2/2

2/2



TOTAL SCORE

20/20

100.0%

Due Date

FRI, JAN 20, 2023

11:59 PM EST



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Assignment Submission & Scoring

## Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

## Assignment Scoring

Your last submission is used for your score.

1. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.1.011.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Determine whether the points lie on a straight line.

(a)  $A(2, 5, 1)$ ,  $B(3, 9, -3)$ ,  $C(1, 3, 3)$

☐ Yes, they do lie on a straight line.

☒ No, they do not.



(b)  $D(0, -4, 4)$ ,  $E(1, -1, 3)$ ,  $F(3, 2, 2)$

☐ Yes, they do lie on a straight line.

☒ No, they do not.



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2. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.1.012.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Find the distance from  $(1, -7, 9)$  to each of the following.

(a) the  $xy$ -plane

9



(b) the  $yz$ -plane

1



(c) the  $xz$ -plane

7



(d) the  $x$ -axis

 $\sqrt{130}$ 

(e) the  $y$ -axis

 $\sqrt{82}$



(f) the z-axis

$\sqrt{50}$



Need Help?

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3. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.1.015.MI.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Find an equation of the sphere that passes through the point  $(6, 1, -1)$  and has center  $(5, 8, 1)$ .

$(x-5)^2+(y-8)^2+(z-1)^2=54$



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4. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.1.019.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Write the equation of the sphere in standard form.

$$2x^2 + 2y^2 + 2z^2 = 4x - 20z + 1$$

$$(x-1)^2 + y^2 + (z+5)^2 = 532$$



Find its center and radius.

center  $(x, y, z) = ($    $, 0, -5$

$\checkmark$   $)$

radius   $\sqrt{532}$

$\checkmark$

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5. [2/2 Points]

DETAILS

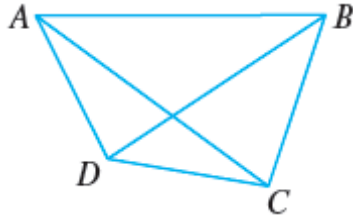
PREVIOUS ANSWERS

SCALCET8 12.2.004.

MY NOTES

ASK YOUR TEACHER

Write each combination of vectors as a single vector.



(a)  $\overrightarrow{AB} + \overrightarrow{BC}$

 $\rightarrow AC$ 



(b)  $\overrightarrow{CD} + \overrightarrow{DB}$

 $\rightarrow CB$ 



(c)  $\overrightarrow{DB} - \overrightarrow{AB}$

 $\rightarrow DA$ 



(d)  $\overrightarrow{DC} + \overrightarrow{CA} + \overrightarrow{AB}$

 $\rightarrow DB$ 



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6. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.3.007.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Find  $\mathbf{a} \cdot \mathbf{b}$ .

$$\mathbf{a} = 3\mathbf{i} + \mathbf{j}, \quad \mathbf{b} = \mathbf{i} - 8\mathbf{j} + \mathbf{k}$$

-5



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7. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.3.009.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Find  $\mathbf{a} \cdot \mathbf{b}$ .

$$|\mathbf{a}| = 4, \quad |\mathbf{b}| = 8, \quad \text{the angle between } \mathbf{a} \text{ and } \mathbf{b} \text{ is } 30^\circ.$$

 $16\sqrt{3}$ 

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8. [2/2 Points]

DETAILS

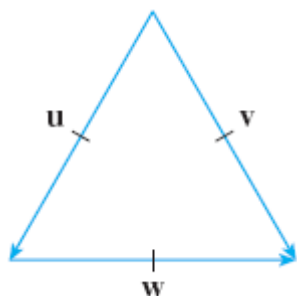
PREVIOUS ANSWERS

SCALCET8 12.3.011.

MY NOTES

ASK YOUR TEACHER

If  $\mathbf{u}$  is a unit vector, find  $\mathbf{u} \cdot \mathbf{v}$  and  $\mathbf{u} \cdot \mathbf{w}$ . (Assume  $\mathbf{v}$  and  $\mathbf{w}$  are also unit vectors.)



$$\mathbf{u} \cdot \mathbf{v} = 0.5$$

$$\mathbf{u} \cdot \mathbf{w} = -0.5$$

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9. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.3.015.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Find the angle between the vectors. (First find an exact expression and then approximate to the nearest degree.)

$$\mathbf{a} = \langle 7, 4 \rangle, \quad \mathbf{b} = \langle 2, -1 \rangle$$

exact

$$\cos^{-1}(105\sqrt{13})$$

approximate

$$56^\circ$$

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10. [2/2 Points]

DETAILS

PREVIOUS ANSWERS

SCALCET8 12.3.039.

MY NOTES

ASK YOUR TEACHER

PRACTICE ANOTHER

Find the scalar and vector projections of  $\mathbf{b}$  onto  $\mathbf{a}$ .

$$\mathbf{a} = \langle -8, 15 \rangle, \quad \mathbf{b} = \langle 3, 5 \rangle$$

scalar projection of  $\mathbf{b}$  onto  $\mathbf{a}$

 $\frac{51\sqrt{289}}{17}$ 

vector projection of  $\mathbf{b}$  onto  $\mathbf{a}$

 $\frac{1}{17} \langle -408, 289, 765, 289 \rangle$ **Need Help?**

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