Section 10.1: Problem 1

Previous | Problem List | Next

(1 point) What are the projections of the point $(-10, 10, -10)$ on the coordinate planes?

On the xy-plane: (____ , ____ , ____)

On the yz-plane: (____ , ____ , ____)

On the xz-plane: (____ , ____ , ____)

Note: *You can earn partial credit on this problem.*

Section 10.1: Problem 2

Previous | Problem List | Next

(1 point) Determine whether the three points $P = (1, 9, 1), Q = (-1, 5, -5), R = (-3, 2, -11)$ are colinear by computing the distances between pairs of points.

Distance from P to Q: ____

Distance from Q to R: ____

Distance from P to R: ____

Are the three points colinear (y/n)? ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.1: Problem 3

Previous | Problem List | Next

(1 point) What is the distance from the point $(2, 4, -4)$ to the xz-plane?

Distance = ____

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have unlimited attempts remaining.

Section 10.1: Problem 4

Previous | Problem List | Next

(1 point) What do the following equations represent in R^3?
Match the two sets of letters:

a. a vertical plane
b. a horizontal plane
c. a plane which is neither vertical nor horizontal

A. $0x + 4y = 1$
B. $x = -10$
C. $y = 4$
D. $z = -3$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.1: Problem 5

Previous | Problem List | Next

(1 point) Find the equation of the sphere centered at $(-6, -9, -4)$ with radius 2.
= 0.
Give an equation which describes the intersection of this sphere with the plane $z = -3$.
= 0.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.

Section 10.1: Problem 6

Previous | Problem List | Next

(1 point) Find the equation of the sphere if one of its diameters has endpoints $(10, 2, 6)$ and $(12, 6, 12)$.
= 0.

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have unlimited attempts remaining.

Section 10.1: Problem 7

Previous | Problem List | Next

(1 point) Find an equation of the sphere that passes through the origin and whose center is $(7, -7, 7)$.

__________ = 0

Note that you must put everything on the left hand side of the equation and that we desire the coefficients of the quadratic terms to be 1.

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have unlimited attempts remaining.

Section 10.1: Problem 8

Previous | Problem List | Next

(1 point) Find an equation of the largest sphere with center $(7, 9, 1)$ that is contained completely in the first octant.

__________ = 0

Note that you must move everything to the left hand side of the equation that we desire the coefficients of the quadratic terms to be 1.

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have unlimited attempts remaining.

Section 10.1: Problem 9

Previous | Problem List | Next

(1 point) Find the center and radius of the sphere

$$x^2 - 14x + y^2 + 12y + z^2 + 6z = -78$$

Center: (____ , ____ , ____)

Radius: ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.

Section 10.1: Problem 10

Previous | Problem List | Next

(1 point) Write down an (in)equality which describes the solid ball of radius 2 centered at $(-9, 6, -10)$. It should have a form like $x^2 + y^2 + (z-2)^2 - 4 >= 0$, where you use one of the following symbols $\leq, <, =, \geq, >$.

The first blank is for the algebraic expression; the drop-down list gives the (in)equatilty.

[ ] ? 0.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.

Section 10.1: Problem 11

Previous | Problem List | Next

(1 point) You are given the following points: $A = (8, 15, -17)$, $B = (20, 0, 5)$, $C = (-7, 3, 13)$.

Which point is closest to the yz-plane? ?

What is the distance from the yz-plane to this point? [ ]

Which point is farthest from the xy-plane? ?

What is the distance from the xy-plane to this point? [ ]

Which point lies on the xz-plane? ?

Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.

Section 10.1: Problem 12

Previous | Problem List | Next

(1 point) Find the distance from $(-8, 3, -11)$ to each of the following:

1. The xy-plane.
Answer:

2. The yz-plane.
Answer:

3. The xz-plane.
Answer:

4. The x-axis.
Answer:

5. The y-axis.
Answer:

6. The z-axis.
Answer:

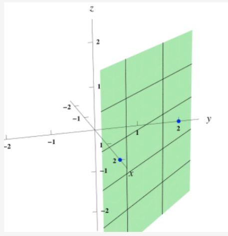
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

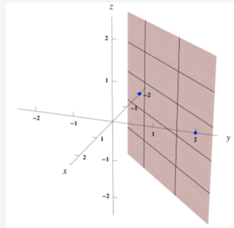
Section 10.1: Problem 13

Previous | Problem List | Next

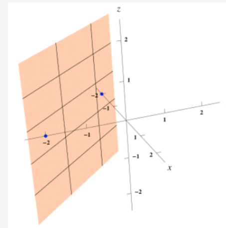
(1 point) Match the equations of the plane with one of the graphs below.



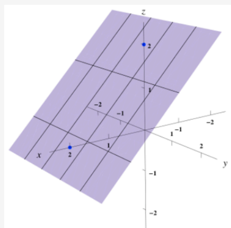
A



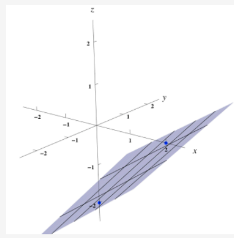
B



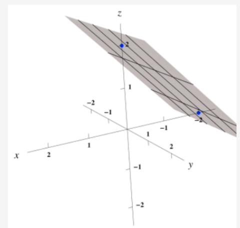
C



D



E



F

1. $x + y = -2$
2. $x + y = 2$
3. $z - x = 2$
4. $y - x = 2$

Note: *You can click on the graphs to enlarge the images.*

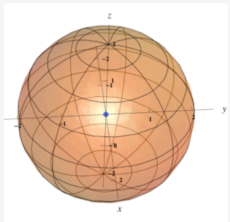
Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

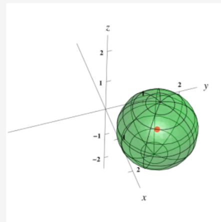
Section 10.1: Problem 14

Previous | Problem List | Next

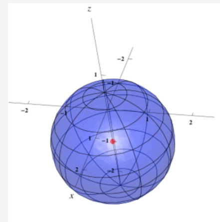
(1 point) Match the equations of the spheres with one of the graphs below.



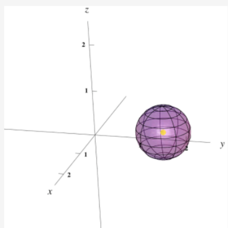
A



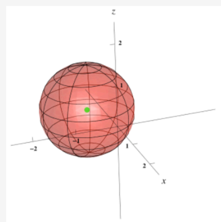
B



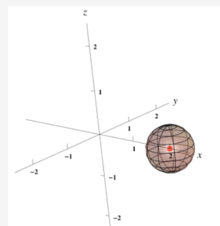
C



D



E



F

1. $x^2 + y^2 + (z+1)^2 = \frac{9}{4}$
2. $x^2 - 4x + y^2 - 4y + z^2 - 2z = -\frac{35}{4}$
3. $x^2 + y^2 + z^2 = 4$
4. $(x-1)^2 + (y-1)^2 + z^2 = 1$

Note: *You can click on the graphs to enlarge the images.*

Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

Section 10.2: Problem 1

Previous | Problem List | Next

(1 point) Let $\mathbf{a} = \langle -1, -3, -5 \rangle$ and $\mathbf{b} = \langle 5, -3, 0 \rangle$.

Compute:

$\mathbf{a} + \mathbf{b} = \langle$ ___ , ___ , ___ $\rangle$

$\mathbf{a} - \mathbf{b} = \langle$ ___ , ___ , ___ $\rangle$

$2\mathbf{a} = \langle$ ___ , ___ , ___ $\rangle$

$3\mathbf{a} + 4\mathbf{b} = \langle$ ___ , ___ , ___ $\rangle$

$|\mathbf{a}| =$ ___

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 2

Previous | Problem List | Next

(1 point) Let $\mathbf{a} = \langle -4, -1, 1 \rangle$.

Find a unit vector in the same direction as $\mathbf{a}$.

$\langle$ ___ , ___ , ___ $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 3

Previous | Problem List | Next

(1 point) Find the unit vector in the direction opposite to $\mathbf{v} = \langle 5, 3 \rangle$.

Preview My Answers | Submit Answers

Section 10.2: Problem 4

Previous | Problem List | Next

(1 point) Find the components and length of the following vectors:

$-5\mathbf{i} - 2\mathbf{j}$

Components: $\langle$, $\rangle$

Length:

$4\mathbf{i} + 4\mathbf{j}$

Components: $\langle$, $\rangle$

Length:

$-3\mathbf{i} - 5\mathbf{j}$

Components: $\langle$, $\rangle$

Length:

$2\mathbf{i} + 1\mathbf{j}$

Components: $\langle$, $\rangle$

Length:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 5

Previous | Problem List | Next

(1 point) If $P = (-1, 3)$ and $Q = (-6, 6)$, find the components of $\overrightarrow{PQ}$

$\overrightarrow{PQ} =$

Preview My Answers | Submit Answers

Section 10.2: Problem 6

Previous | Problem List | Next

(1 point) Determine whether the vectors $\overrightarrow{AB}$ and $\overrightarrow{PQ}$ are equivalent.

$A = (4, 0), \qquad B = (1, 4), \qquad P = (-2, 1), \qquad Q = (-5, 5)$

Select

Preview My Answers | Submit Answers

Section 10.2: Problem 7

Previous | Problem List | Next

(1 point) Let $R = (4, -1)$. Find the point P such that $\overrightarrow{PR}$ has components $\langle -1, -1 \rangle$.

Preview My Answers | Submit Answers

Section 10.2: Problem 8

Previous | Problem List | Next

(1 point) What is the terminal point of the vector $\mathbf{a} = \langle 1, 1 \rangle$ based at $P = (2, 5)$?

Preview My Answers | Submit Answers

Section 10.2: Problem 9

Previous | Problem List | Next

(1 point) Find a vector $\mathbf{a}$ that has the same direction as $\langle -6, 9, 6 \rangle$ but has length 3.

Answer: $\mathbf{a} =$

Preview My Answers | Submit Answers

Section 10.2: Problem 10

Previous | Problem List | Next

(1 point) A child walks due east on the deck of a ship at 1 miles per hour.
The ship is moving north at a speed of 9 miles per hour.

Find the speed and direction of the child relative to the surface of the water.

Speed = mph

The angle of the direction from the north = (radians)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 11

Previous | Problem List | Next

(1 point) A horizontal clothesline is tied between 2 poles, 20 meters apart.
When a mass of 4 kilograms is tied to the middle of the clothesline, it sags a distance of 1 meters.

What is the magnitude of the tension on the ends of the clothesline?
NOTE: Use $g = 9.8m/s^2$ for the gravitational acceleration.

Tension = N

Preview My Answers | Submit Answers

Section 10.2: Problem 12

Previous | Problem List | Next

(1 point) The nine Ring Wraiths want to fly from Barad-Dur to Rivendell. Rivendell is directly north of Barad-Dur. The Dark Tower reports that the wind is coming from the west at 58 miles per hour. In order to travel in a straight line, the Ring Wraiths decide to head northwest. At what speed should they fly (omit units)?

Preview My Answers | Submit Answers

Section 10.2: Problem 13

Previous | Problem List | Next

(1 point)
The figure shows a rectangular box in three-dimensional space that contains several vectors. (The vector **c** is in the xz-plane, and the vector **e** is in the xy-plane.)

Are the following statements true or false?

? 1. $\vec{a} = \vec{d}$

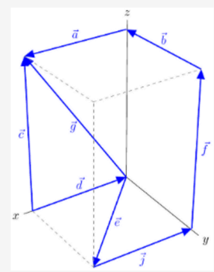
? 2. $\vec{d} = \vec{g} - \vec{c}$

? 3. $\vec{a} = -\vec{b}$

? 4. $\vec{g} = \vec{f} + \vec{a}$

? 5. $\vec{c} = \vec{f}$

? 6. $\vec{e} = \vec{a} - \vec{b}$



(Click on graph to enlarge)

Note: *You can earn 50% partial credit for 3 - 5 correct answers.*

Preview My Answers | Submit Answers

Section 10.2: Problem 14

Previous | Problem List | Next

(1 point) Let $\mathbf{a} = \langle 4, 5 \rangle$ and $\mathbf{b} = \langle 5, -2 \rangle$.
Show that there are scalars s and t so that

$$s\,\mathbf{a} + t\,\mathbf{b} = \langle 16, -13 \rangle$$

You might want to sketch the vectors to get some intuition.

$s =$

$t =$

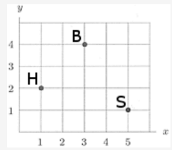
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 15

Previous | Problem List | Next

(1 point) In the figure below the y-axis points north, the x-axis points east, and the xy-plane corresponds to the surface of the water. Suppose a boat is at point B, a submarine is 5 units below point S, and a helicopter is 11 units above point H.



1. Find the displacement vector and the distance from the submarine to the boat.
   Displacement:
   Distance:

2. Find the displacement vector and distance from the helicopter to the boat.
   Displacement:
   Distance:

3. Find the displacement vector and distance from the submarine to the helicopter.
   Displacement:
   Distance:

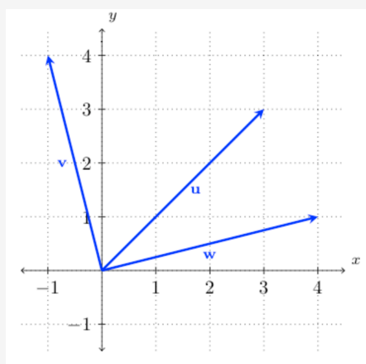
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 16

Previous | Problem List | Next

(1 point) Find the following expressions using the graph below of vectors $\mathbf{u}$, $\mathbf{v}$, and $\mathbf{w}$.



1. $\mathbf{u} + \mathbf{v} =$

2. $2\mathbf{u} + \mathbf{w} =$

3. $3\mathbf{v} - 6\mathbf{w} =$

4. $|\mathbf{w}| =$

Note: *You can click on the graph to enlarge the image.*

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 17

Previous | Problem List | Next

(1 point) Find vectors that satisfy the given conditions:

1. The vector in the opposite direction to $\overline{u} = \langle 4, -4 \rangle$ and of half its length is ______ .
2. The vector of length 5 and in the same direction as $\overline{v} = \langle 1, 3, 5 \rangle$ is ______ .

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.2: Problem 18

Previous | Problem List | Next

(1 point) Let $\overline{u} = \langle 5, 2 \rangle$, $\overline{v} = \langle -2, 4 \rangle$, and $\overline{w} = \langle -3, -5 \rangle$. Find the vector $\overline{x}$ that satisfies

$$7\overline{u} - \overline{v} + \overline{x} = 3\overline{x} + \overline{w}.$$

In this case, $\overline{x} =$ ______ .

Preview My Answers | Submit Answers

Section 10.2: Problem 19

Previous | Problem List | Next

(1 point) Suppose $\overline{u} = \langle -2, 1 \rangle$ and $\overline{v} = \langle 6, 2 \rangle$ are two vectors that form the sides of a parallelogram. Then the lengths of the two diagonals of the parallelogram are
______ .

Separate answers with a comma.

Preview My Answers | Submit Answers

Section 10.3: Problem 1

Previous | Problem List | Next

(1 point) **Distance and Dot Products:** Consider the vectors

$$\mathbf{u} = \langle 3, -3, 4 \rangle \text{ and } \mathbf{v} = \langle -6, -9, -1 \rangle.$$

Compute $||\mathbf{u}|| =$

Compute $||\mathbf{v}|| =$

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

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 2

Previous | Problem List | Next

(1 point) Find $\mathbf{a} \cdot \mathbf{b}$ if

$|\mathbf{a}| = 1$,

$|\mathbf{b}| = 8$,

and the angle between $\mathbf{a}$ and $\mathbf{b}$ is $\frac{\pi}{9}$ radians.

$\mathbf{a} \cdot \mathbf{b} =$

Preview My Answers | Submit Answers

Section 10.3: Problem 3

Previous | Problem List | Next

(1 point) If $\mathbf{a} = \langle -5, -2, -5 \rangle$ and $\mathbf{b} = \langle 5, 3, 3 \rangle$, then

$\mathbf{a} \cdot \mathbf{b} =$

Is the angle between the vectors "acute", "obtuse" or "right"?

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 4

Previous | Problem List | Next

(1 point) Determine if the pairs of vectors below are "parallel", "orthogonal", or "neither".

$\mathbf{a} = \langle 2, 4, 4 \rangle$ and $\mathbf{b} = \langle -6, -12, 15 \rangle$ are

$\mathbf{a} = \langle 2, 4, 4 \rangle$ and $\mathbf{b} = \langle -6, -12, -12 \rangle$ are

$\mathbf{a} = \langle 2, 4, 4 \rangle$ and $\mathbf{b} = \langle 8, 16, 16 \rangle$ are

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 5

Previous | Problem List | Next

(1 point) Find a vector orthogonal to both $\langle 4, -5, 0 \rangle$ and to $\langle 0, -5, -4 \rangle$ of the form

$\langle 1,$ ____ , ____ $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.

Section 10.3: Problem 6

Previous | Problem List | Next

(1 point) What is the angle in radians between the vectors $\mathbf{a} = \langle 9, -10, 7 \rangle$ and $\mathbf{b} = \langle -4, -9, -5 \rangle$?

Angle: ____ (radians)

Preview My Answers | Submit Answers

Section 10.3: Problem 7

Previous | Problem List | Next

(1 point) Find the scalar and vector projection of the vector $\mathbf{b} = \langle -1, -1, 4 \rangle$ onto the vector $\mathbf{a} = \langle 2, 0, 3 \rangle$.

Scalar projection (i.e., component): ____

Vector projection ⟨ ____ , ____ , ____ ⟩

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 8

Previous | Problem List | Next

(1 point) A rectangular box has length 15 inches, width 8 inches, and a height of 9 inches. Find the angle between the diagonal of the box and the diagonal of its base. The angle should be measured in radians.

Angle = ____

Preview My Answers | Submit Answers

Section 10.3: Problem 9

Previous | Problem List | Next

(1 point) Gandalf the Grey started in the Forest of Mirkwood at a point P with coordinates $(0, 0)$ and arrived in the Iron Hills at the point Q with coordinates (1, 4). If he began walking in the direction of the vector $\mathbf{v} = \mathbf{4i} + \mathbf{1j}$ and changes direction only once, when he turns at a right angle, what are the coordinates of the point where he makes the turn?

(____ , ____)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 10

Previous | Problem List | Next

(1 point) A constant force $\mathbf{F} = 3\mathbf{i} + 5\mathbf{j} + 2\mathbf{k}$ is applied to an object that is moving along a straight line from the point $(0, 2, 5)$ to the point $(0, 2, 2)$. Find the work done if the distance is measured in meters and the force in newtons. Include units in your answer. (Note, units are case sensative. Clicking on the link units will give a list of units.)

Answer = ____

Preview My Answers | Submit Answers

Section 10.3: Problem 11

Previous | Problem List | Next

(1 point) A woman exerts a horizontal force of 8 pounds on a box as she pushes it up a ramp that is 8 feet long and inclined at an angle of 30 degrees above the horizontal.

Find the work done on the box.

Work: ____ ft-lb

Preview My Answers | Submit Answers

Section 10.3: Problem 12

Previous | Problem List | Next

(1 point)

Assume that $\mathbf{u} \cdot \mathbf{v} = 8$, $||\mathbf{u}|| = 6$, and $||\mathbf{v}|| = 3$.

What is the value of $9\mathbf{u} \cdot (6\mathbf{u} - 9\mathbf{v})$?

Preview My Answers | Submit Answers

Section 10.3: Problem 13

Previous | Problem List | Next

(1 point) $\mathbf{v} = -9\boldsymbol{i} + 7\boldsymbol{j} + 10\boldsymbol{k}$

$\mathbf{w} = 5\boldsymbol{i} + 5\boldsymbol{j} - 5\boldsymbol{k}$

Compute the dot product $\mathbf{v} \cdot \mathbf{w}$.

Preview My Answers | Submit Answers

Section 10.3: Problem 14

Previous | Problem List | Next

(1 point) The force on an object is $\vec{F} = -14\vec{j}$. For the vector $\vec{v} = -3\vec{i} + 2\vec{j}$, find:

(a) The component of $\vec{F}$ parallel to $\vec{v}$:

(b) The component of $\vec{F}$ perpendicular to $\vec{v}$:

The work, W, done by force $\vec{F}$ through displacement $\vec{v}$:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 15

Previous | Problem List | Next

(1 point) Consider the vectors

$$\vec{a} = 5\vec{i} + \vec{j} - \vec{k}, \qquad \vec{b} = \vec{i} + 5\vec{j} + 6\vec{k}, \qquad \vec{c} = -\vec{i} - 5\vec{j} + \vec{k}$$
$$\vec{d} = \vec{i} - 5\vec{j}, \qquad \vec{g} = -5\vec{i} - \vec{j} + \vec{k}.$$

Which pairs (if any) of these vectors are

(a) Are perpendicular?

*(Enter **none** or a pair or list of pairs, e.g., if $\vec{a}$ is perpendicular to $\vec{b}$ and $\vec{c}$, enter **(a,b),(a,c)**.)*

(b) Are parallel?

*(Enter **none** or a pair or list of pairs, e.g., if $\vec{a}$ is parallel to $\vec{b}$ and $\vec{c}$, enter **(a,b),(a,c)**.)*

(c) Have an angles less than $\pi/2$ between them?

*(Enter **none** or a pair or list of pairs, e.g., if $\vec{a}$ is at an angle less than pi/2 from $\vec{b}$ and $\vec{c}$, enter **(a,b),(a,c)**.)*

(d) Have an angle of more than $\pi/2$ between them?

*(Enter **none** or a pair or list of pairs, e.g., if $\vec{a}$ is at an angle greater than pi/2 from $\vec{b}$ and $\vec{c}$, enter **(a,b),(a,c)**.)*

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 16

Previous | Problem List | Next

(1 point) Perform the following operations on the vectors $\vec{u} = \langle 1, 3, -5 \rangle$, $\vec{v} = \langle -3, 5, 0 \rangle$, and $\vec{w} = \langle -2, 1, 4 \rangle$.

$\vec{u} \cdot \vec{w} =$

$(\vec{u} \cdot \vec{v})\vec{u} =$

$((\vec{w} \cdot \vec{w})\vec{u}) \cdot \vec{u} =$

$\vec{u} \cdot \vec{v} + \vec{v} \cdot \vec{w} =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.3: Problem 17

Previous | Problem List | Next

(1 point)

Several unit vectors $\vec{r}, \vec{s}, \vec{t}, \vec{u}, \vec{n}$, and $\vec{e}$ in the xy-plane (not three-dimensional space) are shown in the figure.

Using the geometric definition of the dot product, are the following dot products positive, negative, or zero? You may assume that angles that look the same are the same.

? 1. $\vec{e} \cdot \vec{r}$

? 2. $\vec{e} \cdot \vec{s}$

? 3. $\vec{s} \cdot \vec{t}$

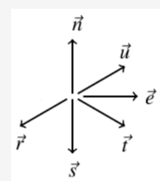
? 4. $\vec{t} \cdot \vec{u}$

? 5. $\vec{r} \cdot \vec{s}$

? 6. $\vec{r} \cdot \vec{u}$

? 7. $\vec{n} \cdot \vec{e}$

? 8. $\vec{n} \cdot \vec{t}$



(Click on graph to enlarge)

Note: *You can earn 10% partial credit for 2 - 4 correct answers, 60% partial credit for 5 - 6 correct answers, and 80% partial credit for 7 correct answers.*

Preview My Answers | Submit Answers

Section 10.3: Problem 18

Previous | Problem List | Next

(1 point) For what values of b are the vectors $\langle -53, b, 4\rangle$ and $\langle b, b^2, b\rangle$ orthogonal?

Answer (separate with commas) $b =$ ______

Preview My Answers | Submit Answers

Section 10.4: Problem 1

Previous | Problem List | Next

(1 point) Find the cross product $\mathbf{a} \times \mathbf{b}$ where $\mathbf{a} = \langle -3, 4, -1\rangle$ and $\mathbf{b} = \langle 4, 3, 5\rangle$.

$\mathbf{a} \times \mathbf{b} = \langle$ ______ , ______ , ______ $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.4: Problem 2

Previous | Problem List | Next

(1 point) Find the cross product $\mathbf{a} \times \mathbf{b}$ where $\mathbf{a} = \langle 3, 4, -1\rangle$ and $\mathbf{b} = \langle -1, 2, -5\rangle$.

$\mathbf{a} \times \mathbf{b} = \langle$ ______ , ______ , ______ $\rangle$

Find the cross product $\mathbf{c} \times \mathbf{d}$ where $\mathbf{c} = -2\mathbf{i} + 1\mathbf{j} + 3\mathbf{k}$ and $\mathbf{d} = 4\mathbf{i} - 1\mathbf{j} - 2\mathbf{k}$.

$\mathbf{c} \times \mathbf{d} =$ ______ $\mathbf{i}+$ ______ $\mathbf{j}+$ ______ $\mathbf{k}$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.4: Problem 3

Previous | Problem List | Next

(1 point) You are looking down at a map. A vector $\mathbf{u}$ with $|\mathbf{u}| = 3$ points north and a vector $\mathbf{v}$ with $|\mathbf{v}| = 2$ points northeast. The crossproduct $\mathbf{u} \times \mathbf{v}$ points:

A) south
B) northwest
C) up
D) down

Please enter the letter of the correct answer:

The magnitude $|\mathbf{u} \times \mathbf{v}| =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.4: Problem 4

Previous | Problem List | Next

(1 point) Think of the letter $\mathbf{X}$ as four vectors starting from the center and pointing outward. Label the four vectors starting from the top left and proceeding clockwise as $\mathbf{u}$, $\mathbf{v}$, $\mathbf{w}$, $\mathbf{z}$.

Does $\mathbf{u} \times \mathbf{v}$ point in or out of the page? (in/out)

Does $\mathbf{u} \times \mathbf{z}$ point in or out of the page? (in/out)

Compute $\mathbf{u} \times \mathbf{w}$

$\langle$, , $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.4: Problem 5

Previous | Problem List | Next

(1 point) Find two unit vectors orthogonal to $\mathbf{a} = \langle -3, 3, 0 \rangle$ and $\mathbf{b} = \langle -2, 4, -5 \rangle$

Enter your answer so that the first non-zero coordinate of the first vector is positive.

First Vector: $\langle$, , $\rangle$

Second Vector: $\langle$, , $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.4: Problem 6

Previous | Problem List | Next

(1 point) Find the area of the triangle with vertices:
$Q(0, 4, -3), R(3, 1, -6), S(5, 6, -7)$.

Preview My Answers | Submit Answers

Section 10.4: Problem 7

Previous | Problem List | Next

(1 point) Find the area of the parallelogram with vertices:
$P(0, 0, 0), Q(1, 4, -1), R(1, 2, 1), S(2, 6, 0)$.

Preview My Answers | Submit Answers

Section 10.4: Problem 8

Previous | Problem List | Next

(1 point) Find the distance the point $P(0, -2, 3)$ is to the line through the two points $Q(2, -5, 5)$, and $R(3, -4, 3)$.

Preview My Answers | Submit Answers

Section 10.4: Problem 9

Previous | Problem List | Next

(1 point) Find the volume of the parallelopiped with adjacent edges PQ, PR, PS where
$P(5,-5,3),\ Q(7,-2,6),\ R(4,-6,2),\ S(11,-7,5).$

Preview My Answers | Submit Answers

Section 10.5: Problem 1

Previous | Problem List | Next

(1 point) Consider the following geometry problems in 3-space
Enter T or F depending on whether the statement is true or false. (You must enter T or F -- True and False will not work.)

1. Two planes parallel to a line are parallel
2. Two planes orthogonal to a third plane are parallel
3. Two lines either intersect or are parallel
4. Two planes either intersect or are parallel
5. Two lines orthogonal to a plane are parallel
6. Two lines parallel to a third line are parallel
7. A plane and a line either intersect or are parallel
8. Two lines orthogonal to a third line are parallel
9. Two planes orthogonal to a line are parallel
10. Two lines parallel to a plane are parallel
11. Two planes parallel to a third plane are parallel

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 2

Previous | Problem List | Next

(1 point) Given the vector equation $\mathbf{r}(t) = (2 + 4t)\mathbf{i} + (-5 + 4t)\mathbf{j} + (3 + 2t)\mathbf{k}$, rewrite this in terms of the parametric equations for the line.

$x(t) =$

$y(t) =$

$z(t) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 3

Previous | Problem List | Next

(1 point) **Vectors:** Find the vector from the point $A = (4, 9, 4)$ to the point $B = (9, -2, -5)$.

$\overrightarrow{AB} = \langle$, , $\rangle$

Equations of lines: Consider the vector equation of the line through the two points listed above. For each equation listed below, answer **T** if the equation represents the line, and **F** if it does not. Here is the list of questions:

1. $\langle x, y, z \rangle = \langle 4, 9, 4 \rangle + t \langle -5, +11, +9 \rangle$

2. $\langle x, y, z \rangle = \langle 9, -2, -5 \rangle + t \langle 4, 9, 4 \rangle$

3. $\langle x, y, z \rangle = \langle 4, 9, 4 \rangle + t \langle 9, -2, -5 \rangle$

4. $\langle x, y, z \rangle = \langle 4, 9, 4 \rangle + t \langle 5, -11, -9 \rangle$

5. $\langle x, y, z \rangle = \langle 9, -2, -5 \rangle + t \langle 5, -11, -9 \rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 4

Previous | Problem List | Next

(1 point) Find the vector and parametric equations for the line through the point $P = (1, 4, 1)$ and parallel to the vector $\langle -1, 2, 3 \rangle$.

Vector Form: $\mathbf{r}(t) =$ ______

Parametric form (parameter t, and passing through P when $t = 0$):

$x = x(t) =$ ______

$y = y(t) =$ ______

$z = z(t) =$ ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 5

Previous | Problem List | Next

(1 point) Consider the line which passes through the point $P(1, -2, -5)$, and which is parallel to the line $x = 1 + 4t, y = 2 + 2t, z = 3 + t$
Find the point of intersection of this new line with each of the coordinate planes:

xy-plane: (______ , ______ , ______)

xz-plane: (______ , ______ , ______)

yz-plane: (______ , ______ , ______)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 6

Previous | Problem List | Next

(1 point) Find the vector and parametric equations for the line through the point $P(-4, -1, 5)$ and orthogonal to the plane $2x - 5y + 3z = -3$.

Vector Form: $\mathbf{r} = \langle$ ______ , ______ $, 5\rangle + t\langle$ ______ , ______ $, 3\rangle$

Parametric form (parameter t, and passing through P when $t = 0$):

$x = x(t) =$ ______

$y = y(t) =$ ______

$z = z(t) =$ ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 7

Previous | Problem List | Next

(1 point) Find the vector and parametric equations for the line through the point $P(-4, 4, 3)$ and the point $Q(-2, 5, 8)$.

Vector Form: $\mathbf{r} = \langle$ ____ , ____ $, 3\rangle + t\langle$ ____ , ____ $, 5\rangle$

Parametric form (parameter t, and passing through P when $t = 0$):

$x = x(t) =$ ____

$y = y(t) =$ ____

$z = z(t) =$ ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 8

Previous | Problem List | Next

(1 point) Find the vector equation for the line of intersection of the planes $x + 2y + 2z = 3$ and $x + 5z = 1$

$\mathbf{r} = \langle$ ____ , ____ $, 0\rangle + t\langle 10,$ ____ , ____ $\rangle$.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 9

Previous | Problem List | Next

(1 point) Consider the two lines
$L_1: x = -2t,\ y = 1 + 2t,\ z = 3t$ and
$L_2: x = -6 + 2s,\ y = 3 + 2s,\ z = 2 + 4s$

Find the point of intersection of the two lines.
P = (, ,)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 10

Previous | Problem List | Next

(1 point) Determine whether the lines

$$L_1: x = 19 + 5t, \quad y = 6 + 2t, \quad z = 16 + 6t$$

and

$$L_2: x = -8 + 6t \quad y = -8 + 4t \quad z = -20 + 9t$$

intersect, are skew, or are parallel. If they intersect, determine the point of intersection; if not leave the remaining answer blanks empty.

Do/are the lines: ?
Point of intersection: (, ,)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 11

Previous | Problem List | Next

(1 point) Find an equation of a plane through the point $(-2,5,-3))$ which is orthogonal to the line

$$x = 3 - t,\ y = -(1+3t),\ z = 4t - 2$$

.

Preview My Answers | Submit Answers

Section 10.5: Problem 12

Previous | Problem List | Next

(1 point) Find an equation of the plane through the point $(-2,3,3)$ which is parallel to the plane $2x + 3y + 3z = -3$.

Preview My Answers | Submit Answers

Section 10.5: Problem 13

Previous | Problem List | Next

(1 point) Find an equation of a plane containing the line $\mathbf{r} = \langle 0,0,-3\rangle + t\langle -14,4,-2\rangle$ which is parallel to the plane $4z - (2x+5y) = -17$

.

Preview My Answers | Submit Answers

Section 10.5: Problem 14

Previous | Problem List | Next

(1 point) Find an equation of a plane containing the three points $A = (3,-5,1)$, $B = (8,-8,2)$, $C = (8,-7,4)$

.

Preview My Answers | Submit Answers

Section 10.5: Problem 15

Previous | Problem List | Next

(1 point) Find the point P where the line $x = 1 + t, y = 2t, z = -3t$ intersects the plane $x + y - z = 4$.

P = (______ , ______ , ______)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 16

Previous | Problem List | Next

(1 point) Compare the planes below to the plane $-4x + 3y + 2z = 4$. Match the letter corresponding to the words parallel, orthogonal, or "neither" which describes the relation of the two planes.

______ **1.** $12x - 9y - 6z = -3$
______ **2.** $-4x + 4y + 2z = -5$
______ **3.** $-3x - 4y = 5$

A. parallel
B. neither
C. orthogonal

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 17

Previous | Problem List | Next

(1 point) Find the angle of intersection of the plane $z - (4x + 4y) = -4$ with the plane $-(x + 5y + 5z) = -5$.
Answer in radians:

______

and in degrees:

______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.5: Problem 18

Previous | Problem List | Next

(1 point) A million years ago, an alien species built a vertical tower on a horizontal plane. When they returned they discovered that the ground had tilted so that measurements of 3 points on the ground gave coordinates of $(0,0,0)$, $(1,2,0)$, and $(0,2,3)$. By what angle does the tower now deviate from the vertical?

_____ radians.

Preview My Answers | Submit Answers

Section 10.5: Problem 19

Previous | Problem List | Next

(1 point) Find an equation of the plane consisting of all points that are equidistant from $A(-2,-2,-5)$ and $B(-2,4,-5)$.

_____

Preview My Answers | Submit Answers

Section 10.5: Problem 20

Previous | Problem List | Next

(1 point) Find the distance from the point $Q = (-2,-2,4)$ to the plane $2x + 2y - 5z = 8$.

_____

Preview My Answers | Submit Answers

Section 10.5: Problem 21

Previous | Problem List | Next

(1 point) Consider the planes $5x + 5y + 2z = 1$ and $5x + 2z = 0$.

(A) Find the unique point P on the y−axis which is on both planes. (___ , ___ , ___)

(B) Find a unit vector $\mathbf{u}$ with positive first coordinate that is parallel to both planes.

$\mathbf{u} =$ ___ $\mathbf{i} +$ ___ $\mathbf{j} +$ ___ $\mathbf{k}$

(C) Use parts (A) and (B) to find a vector equation for the line of intersection of the two planes.

$\mathbf{r}(t) =$ ___ $\mathbf{i} +$ ___ $\mathbf{j} +$ ___ $\mathbf{k}$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.6: Problem 1

Previous | Problem List | Next

(1 point) Match the surfaces with the appropriate descriptions.

___ **1.** $z = 2x^2 + 3y^2$

___ **2.** $z = x^2$

___ **3.** $z = y^2 - 2x^2$

___ **4.** $z = 4$

___ **5.** $z = 2x + 3y$

___ **6.** $x^2 + y^2 = 5$

___ **7.** $x^2 + 2y^2 + 3z^2 = 1$

A. parabolic cylinder
B. circular cylinder
C. ellipsoid
D. hyperbolic paraboloid
E. horizontal plane
F. nonhorizontal plane
G. elliptic paraboloid

Note: *You can earn partial credit on this problem.*

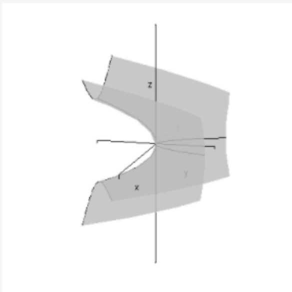
Preview My Answers | Submit Answers

Section 10.6: Problem 2

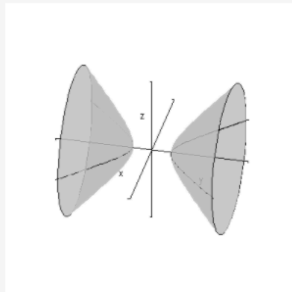
Previous | Problem List | Next

(1 point) Match the equation with its graph labeled A-F. You may click on any image to get a larger view.

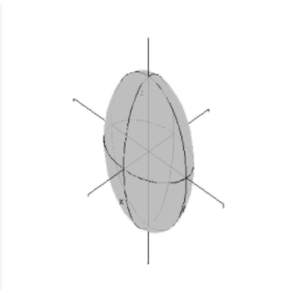
A.



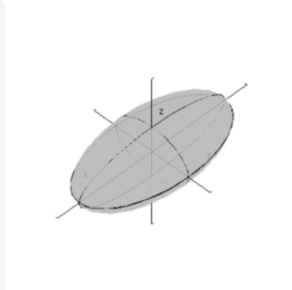
B.



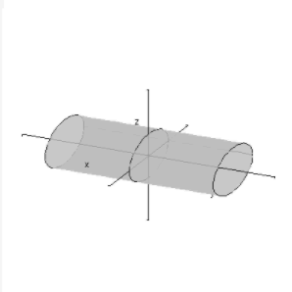
C.



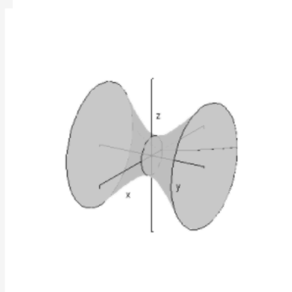
D.



E.



F.



1. $y = x^2 - z^2$
2. $9x^2 + 4y^2 + z^2 = 1$
3. $x^2 + 2z^2 = 1$
4. $x^2 + 4y^2 + 9z^2 = 1$
5. $-x^2 + y^2 - z^2 = 1$
6. $x^2 - y^2 + z^2 = 1$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.6: Problem 3

Previous | Problem List | Next

(1 point) State the type of the quadratic surface:

$$\left(\frac{x}{4}\right)^2 + \left(\frac{y}{6}\right)^2 + \left(\frac{z}{5}\right)^2 = 1$$

1. Ellipsoid
2. Hyperboloid of one sheet
3. Hyperboloid of two sheets
4. None of these

Describe the trace obtained by intersecting with the plane $z = 1$:

1. Ellipse
2. Hyperbola
3. Circle
4. Empty set

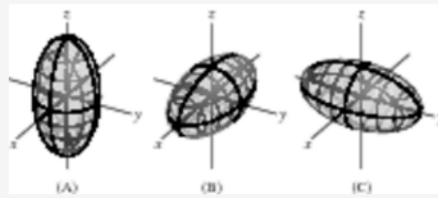
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.6: Problem 4

Previous | Problem List | Next

(1 point)



Match the ellipsoids shown in the figure above with the equations:

1) $x^2 + 4y^2 + 4z^2 = 16$

2) $4x^2 + y^2 + 4z^2 = 16$

3) $4x^2 + 4y^2 + z^2 = 16$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.6: Problem 5

Previous | Problem List | Next

(1 point) State whether the equation

$$z^2 = \left(\frac{x}{7}\right)^2 - \left(\frac{y}{2}\right)^2$$

defines (enter number of statement):

1. A hyperbolic paraboloid
2. An elliptic paraboloid
3. An elliptic cone
4. None of these

Preview My Answers | Submit Answers

Section 10.6: Problem 6

Previous | Problem List | Next

(1 point) State whether the equation

$25x^2 - 25y^2 + 25z^2 = 1$

defines (enter number of statement):

1. A hyperboloid of two sheets
2. A hyperboloid of one sheet
3. An ellipsoid
4. None of these

Preview My Answers | Submit Answers

Section 10.6: Problem 7

Previous | Problem List | Next

(1 point) Find the equation of the ellipsoid passing through the points $(\pm 4, 0, 0)$, $(0, \pm 8, 0)$ and $(0, 0, \pm 7)$

$= 1$

Preview My Answers | Submit Answers

Section 10.6: Problem 8

Previous | Problem List | Next

(1 point) State the type of the quadratic surface:

$$x^2 + \left(\frac{y}{2}\right)^2 + z^2 = 1$$

1. Hyperboloid of two sheets
2. Hyperboloid of one sheet
3. Ellipsoid
4. None of these

Describe the trace obtained by intersecting with the plane $y = 0$:

1. Ellipse
2. Hyperbola
3. Circle
4. Empty set

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 1

Previous | Problem List | Next

(1 point) Find the domain of the vector functions, $\mathbf{r}(t)$, listed below.
You may use "-INF" for $-\infty$ and use "INF" for ∞ as necessary, and use "U" for a union symbol if a union of intervals is needed.

a) $\mathbf{r}(t) = \left\langle \ln(3t), \sqrt{t+15}, \frac{1}{\sqrt{16-t}} \right\rangle$

b) $\mathbf{r}(t) = \left\langle \sqrt{t-1}, \sin(2t), t^2 \right\rangle$

c) $\mathbf{r}(t) = \left\langle e^{-1t}, \frac{t}{\sqrt{t^2-4}}, t^{1/3} \right\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 2

Previous | Problem List | Next

(1 point) Let $\mathbf{r}(t) = (\sqrt{t+1})\,\mathbf{i} + \left(\frac{t^2-4}{t-2}\right)\mathbf{j} + \sin(-2\pi t)\,\mathbf{k}$.

Then

$\lim_{t\to 1} \mathbf{r}(t) =$ ______ $\mathbf{i}+$ ______ $\mathbf{j}+$ ______ $\mathbf{k}$.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 3

Previous | Problem List | Next

(1 point) Find the limit:

$$\lim_{t\to 0}\left\langle \frac{e^{3t}-1}{t}, \frac{t^1}{t^2-t^1}, \frac{-5}{15+t}\right\rangle$$

$\langle$ ______ , ______ , ______ $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 4

Previous | Problem List | Next

(1 point) The curve $\mathbf{c}(t) = \langle \cos t, \sin t, t \rangle$ lies on which of the following surfaces.
Enter **T** or **F** depending on whether the statement is true or false.
(You must enter **T** or **F** -- True and False will not work.)

1. a sphere
2. a plane
3. a circular cylinder
4. an ellipsoid

Note: *You can earn partial credit on this problem.*

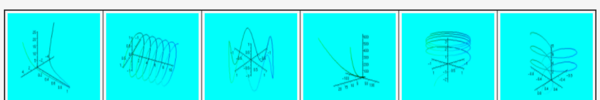
Preview My Answers | Submit Answers

Section 10.7: Problem 5

Previous | Problem List | Next

(1 point) Match the parametric equations with the graphs labeled A - F. As always, you may click on the thumbnail image to produce a larger image in a new window (sometimes exactly on top of the old one).

1. $x = \cos 4t, y = t, z = \sin 4t$
2. $x = t^2 - 2, y = t^3, z = t^4 + 1$
3. $x = \cos t, y = \sin t, z = \ln t$
4. $x = \cos t, y = \sin t, z = \sin 5t$
5. $x = \sin 3t \cos t, y = \sin 3t \sin t, z = t$
6. $x = t, y = 1/(1 + t^2), z = t^2$



A | B | C | D | E | F

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 6

Previous | Problem List | Next

(1 point) Find a vector function that represents the curve of intersection of the paraboloid $z = 3x^2 + 4y^2$ and the cylinder $y = 3x^2$. Use the variable t for the parameter.
$\mathbf{r}(t) = \langle t,$ ______ , ______ $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 7

Previous | Problem List | Next

(1 point) Consider the paraboloid $z = x^2 + y^2$. The plane $3x - 5y + z - 9 = 0$ cuts the paraboloid, its intersection being a curve.
Find "the natural" parametrization of this curve.
Hint: The curve which is cut lies above a circle in the xy-plane which you should parametrize as a function of the variable t so that the circle is traversed counterclockwise exactly once as t goes from 0 to 2*pi, and the paramterization starts at the point on the circle with largest x coordinate. Using that as your starting point, give the parametrization of the curve on the surface.

$\mathbf{c}(t) = (x(t), y(t), z(t))$, where
$x(t) =$ ______
$y(t) =$ ______
$z(t) =$ ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 8

Previous | Problem List | Next

(1 point) Find the derivative of the vector function

$$\mathbf{r}(t) = \ln(11 - t^2)\mathbf{i} + \sqrt{2+t}\,\mathbf{j} + 8e^{-4t}\mathbf{k}$$

$\mathbf{r}'(t) = \langle$ ______ , ______ , ______ $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 9

Previous | Problem List | Next

(1 point) For the given position vectors $\mathbf{r}(t)$ compute the unit tangent vector $\mathbf{T}(t)$ for the given value of t .

A) Let $\mathbf{r}(t) = \langle \cos 3t, \sin 3t \rangle$.
Then $\mathbf{T}(\frac{\pi}{4})\langle$ ______ , ______ $\rangle$

B) Let $\mathbf{r}(t) = \langle t^2, t^3 \rangle$.
Then $\mathbf{T}(1) = \langle$ ______ , ______ $\rangle$

C) Let $\mathbf{r}(t) = e^{3t}\mathbf{i} + e^{-t}\mathbf{j} + t\mathbf{k}$.
Then $\mathbf{T}(4)=$ ______ $\mathbf{i}+$ ______ $\mathbf{j}+$ ______ $\mathbf{k}$.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 10

Previous | Problem List | Next

(1 point) Find parametric equations for the tangent line at the point $\left(\cos\left(\frac{5}{6}\pi\right), \sin\left(\frac{5}{6}\pi\right), \frac{5}{6}\pi\right)$ on the curve $x = \cos t,\ y = \sin t,\ z = t$

$x(t)$ =

$y(t)$=

$z(t)$=

(Your line should be parametrized so that it passes through the given point at t=0).

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 11

Previous | Problem List | Next

(1 point) Find the parametric equations for the tangent line to the curve

$$x = t^3 - 1, y = t^5 + 1, z = t$$

at the point $(7, 33, 2)$. Use the variable t for your parameter.

$x =$,

$y =$,

$z =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 12

Previous | Problem List | Next

(1 point) Evaluate

$$\int_0^3 \left(t\mathbf{i} + t^2\mathbf{j} + t^3\mathbf{k}\right)\,dt = \_\_\_\ \mathbf{i} + \_\_\_\ \mathbf{j} + \_\_\_\ \mathbf{k}.$$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 13

Previous | Problem List | Next

(1 point) If $\mathbf{r}(t) = \cos(2t)\mathbf{i} + \sin(2t)\mathbf{j} - 10t\mathbf{k}$
compute $\mathbf{r}'(t)$= ______ $\mathbf{i}+$ ______ $\mathbf{j}+$ ______ $\mathbf{k}$

and $\int \mathbf{r}(t)\,dt$= ______ $\mathbf{i}+$ ______ $\mathbf{j}+$ ______ $\mathbf{k} + \mathbf{C}$
with $\mathbf{C}$ a constant vector.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 14

Previous | Problem List | Next

(1 point) Find a vector parametrization of the curve $x = -5z^2$ in the xz-plane. Use t as the parameter in your answer.

$\vec{r}(t) =$ ______

Preview My Answers | Submit Answers

Section 10.7: Problem 15

Previous | Problem List | Next

(1 point) Are the following statements true or false?

? **1.** A parametrization of the graph of $y = \ln(x)$ for $x > 0$ is given by $x = e^t, y = t$ for $-\infty < t < \infty$.

? **2.** The parametric curve $x = (3t+4)^2, y = 5(3t+4)^2 - 9$, for $0 \le t \le 3$ is a line segment.

? **3.** The line parametrized by $x = 7, y = 5t, z = 6 + t$ is parallel to the x-axis.

Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

Section 10.7: Problem 16

Previous | Problem List | Next

(1 point) Find a vector parametric equation $\vec{r}(t)$ for the line through the points $P = (-4, 5, -3)$ and $Q = (-5, 8, -1)$ for each of the given conditions on the parameter t.

(a) If $\vec{r}(0) = \langle -4, 5, -3 \rangle$ and $\vec{r}(4) = \langle -5, 8, -1 \rangle$, then
$\vec{r}(t) =$

(b) If $\vec{r}(3) = P$ and $\vec{r}(5) = Q$, then
$\vec{r}(t) =$

(c) If the points P and Q correspond to the parameter values $t = 0$ and $t = -4$, respectively, then
$\vec{r}(t) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 17

Previous | Problem List | Next

(1 point) The function $\mathbf{r}(t)$ traces a circle. Determine the radius, center, and plane containing the circle
$\mathbf{r}(t) = -6\mathbf{i} + (5\cos(t))\mathbf{j} + (5\sin(t))\mathbf{k}$

Plane : $x =$

Circle's Center : (, ,)

Radius :

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.7: Problem 18

Previous | Problem List | Next

(1 point) Use $\cos(t)$ and $\sin(t)$, with positive coefficients, to parametrize the intersection of the surfaces $x^2 + y^2 = 81$ and $z = 8x^3$.

$\mathbf{r}(t) = \langle$, , $\rangle$

Preview My Answers | Submit Answers

Section 10.7: Problem 19

Previous | Problem List | Next

(1 point) Find a parametrization, using $\cos(t)$ and $\sin(t)$, of the following curve:
The intersection of the plane $y = 4$ with the sphere $x^2 + y^2 + z^2 = 97$

$\mathbf{r}(t) = \langle$ ___ , ___ , ___ $\rangle$

Preview My Answers | Submit Answers

Section 10.7: Problem 20

Previous | Problem List | Next

(1 point) Find the solution $\mathbf{r}(t)$ of the differential equation with the given initial condition:

$$\mathbf{r}'(t) = \langle \sin 5t, \sin 2t, 5t \rangle, \mathbf{r}(0) = \langle 3, 3, 8 \rangle$$

$\mathbf{r}(t) = \langle$ ___ , ___ , ___ $\rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.8: Problem 1

Previous | Problem List | Next

(1 point) Find the length of the given curve:

$$\mathbf{r}(t) = \langle 2t, 4\sin t, 4\cos t \rangle$$

where $-4 \leq t \leq 2$.

___

Preview My Answers | Submit Answers

Section 10.8: Problem 2

Previous | Problem List | Next

(1 point) Find the arclength of the curve $\mathbf{r}(t) = \left\langle 5\sqrt{2}t, e^{5t}, e^{-5t} \right\rangle, 0 \le t \le 1$

Preview My Answers | Submit Answers

Section 10.8: Problem 3

Previous | Problem List | Next

(1 point) Consider the path $\mathbf{r}(t) = \langle 4t, 2t^2, 2\ln t \rangle$ defined for $t > 0$.
Find the length of the curve between the points $(4, 2, 0)$ and $(16, 32, 2\ln(4))$.

Preview My Answers | Submit Answers

Section 10.8: Problem 4

Previous | Problem List | Next

(1 point) Consider the helix $\mathbf{r}(t) = \langle \cos(7t), \sin(7t), -2t \rangle$. Compute, at $t = \frac{\pi}{6}$:

A. The unit tangent vector $\mathbf{T} = \langle \quad , \quad , \quad \rangle$

B. The unit normal vector $\mathbf{N} = \langle \quad , \quad , \quad \rangle$

C. The unit binormal vector $\mathbf{B} = \langle \quad , \quad , \quad \rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.9: Problem 1

Previous | Problem List | Next

(1 point) Find the velocity, acceleration, and speed of a particle with position function
$\mathbf{r}(t) = \langle -7t\sin(t), -7t\cos(t), -t^2 \rangle$

$\mathbf{v}(t) = \langle$ ____ , ____ , ____ $\rangle$

$\mathbf{a}(t) = \langle$ ____ , ____ , ____ $\rangle$

$|\mathbf{v}(t)| =$ ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.9: Problem 2

Previous | Problem List | Next

(1 point) Find the velocity and position vectors of a particle with acceleration $\mathbf{a}(t) = 3\mathbf{k}$, and initial conditions $\mathbf{v}(0) = -2\mathbf{j} - 5\mathbf{k}$ and $\mathbf{r}(0) = -3\mathbf{i} - 1\mathbf{j} + 5\mathbf{k}$.

$\mathbf{v}(t) =$ ____ $\mathbf{i}+$ ____ $\mathbf{j}+$ ____ $\mathbf{k}$

$\mathbf{r}(t) =$ ____ $\mathbf{i}+$ ____ $\mathbf{j}+$ ____ $\mathbf{k}$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.9: Problem 3

Previous | Problem List | Next

(1 point) Given that the acceleration vector is $\mathbf{a}(t) = (-16\cos(4t))\mathbf{i} + (-16\sin(4t))\mathbf{j} + (t)\mathbf{k}$, the initial velocity is $\mathbf{v}(0) = \mathbf{i} + \mathbf{k}$, and the initial position vector is $\mathbf{r}(0) = \mathbf{i} + \mathbf{j} + \mathbf{k}$, compute:

A. The velocity vector $\mathbf{v}(t) =$ ____ $\mathbf{i}+$ ____ $\mathbf{j}+$ ____ $\mathbf{k}$

B. The position vector $\mathbf{r}(t) =$ ____ $\mathbf{i}+$ ____ $\mathbf{j}+$ ____ $\mathbf{k}$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.9: Problem 4

Previous | Problem List | Next

(1 point) The position function of a particle is given by $\mathbf{r}(t) = \langle -2t^2, -3t, t^2 - t \rangle$.
At what time is the speed minimum? ____

Preview My Answers | Submit Answers

Section 10.9: Problem 5

Previous | Problem List | Next

(1 point) A dense particle with mass 8 kg follows the path $\mathbf{r}(t) = \langle \sin(9t), \cos(8t), 2t^{7/2} \rangle$ with units in meters and seconds. What force acts on the mass at $t = 0$?

$\langle$ ___ , ___ , ___ $\rangle$ $kg\ m/s^2$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.9: Problem 6

Previous | Problem List | Next

(1 point) A projectile is fired from ground level with an initial speed of 350 m/sec and an angle of elevation of 30 degrees. Use that the acceleration due to gravity is 9.8 m/sec^2.

(a) The range of the projectile is ___ meters.

(b) The maximum height of the projectile is ___ meters.

(c) The speed with which the projectile hits the ground is ___ m/sec.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 10.9: Problem 7

Previous | Problem List | Next

(1 point) A ball is thrown at an angle of 45 degrees to the ground, and lands 20 meters away.
The initial speed of the ball was ___ m/sec.

Preview My Answers | Submit Answers

Section 10.9: Problem 8

Previous | Problem List | Next

(1 point) A body of mass 10 kg moves in a (counterclockwise) circular path of radius 5 meters, making one revolution every 7 seconds. You may assume the circle is in the xy-plane, and so you may ignore the third component.

A. Compute the centripetal force acting on the body.

(______ , ______)

B. Compute the magnitude of that force. ______

Note: *Use exact forms or at least 4 significant digits in your answers.*

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.1: Problem 1

Previous | Problem List | Next

(1 point) Evaluate the function at the specified points.

$h(x, y, z) = xy^{-2}z, (-3, 5, -2), (5, 2, 5)$

At $(-3, 5, -2)$: ______

At $(5, 2, 5)$: ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.1: Problem 2

Previous | Problem List | Next

(1 point) The domain of the function $f(x, y) = \sqrt{x} + \sqrt{y}$ is

A. The first quadrant
B. The union of two intervals
C. The area inside a parabola
D. All of the xy-plane
E. The first and third quadrants

Preview My Answers | Submit Answers

Section 11.1: Problem 3

Previous | Problem List | Next

(1 point) The domain of the function $f(x, y) = \dfrac{3x + 5y}{x^2 + y^2 - 4}$ is

A. All the xy-plane except a circle
B. The union of two intervals
C. The area inside a circle (including the circle)
D. The first quadrant
E. The area inside a circle (not including the circle)

Preview My Answers | Submit Answers

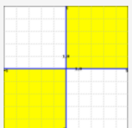
Section 11.1: Problem 4

Previous | Problem List | Next

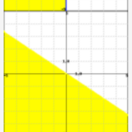
(1 point) Match the functions with the graphs of their domains.

1. $f(x,y) = -(2x+3y)$
2. $f(x,y) = e^{-\frac{1}{2x+3y}}$
3. $f(x,y) = \ln(-(2x+3y))$
4. $f(x,y) = \sqrt{x^3y^3}$

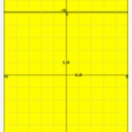
A.



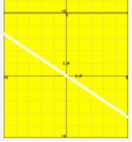
B.



C.



D.



Note: *You can earn partial credit on this problem.*

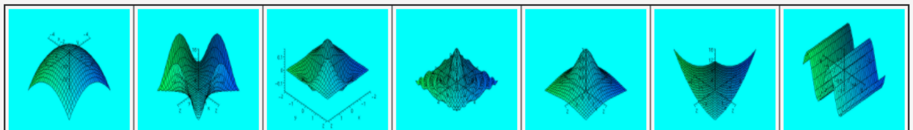
Preview My Answers | Submit Answers

Section 11.1: Problem 5

Previous | Problem List | Next

(1 point) Match the functions with the graphs labeled A - G. As always, you may click on the thumbnail image to produce a larger image in a new window (sometimes exactly on top of the old one). Just take your time; process of elimination will help with ones that are not obvious.

1. $f(x, y) = 1/(1 + x^2 + y^2)$
2. $f(x, y) = \sin(y)$
3. $f(x, y) = 3 - x^2 - y^2$
4. $f(x, y) = (x^2 - y^2)^2$
5. $f(x, y) = \cos(x^2 + y^2)/(1 + x^2 + y^2)$
6. $f(x, y) = \sin(x)\sin(y)e^{-x^2-y^2}$
7. $f(x, y) = (x - y)^2$



A	B	C	D	E	F	G

Note: *You can earn partial credit on this problem.*

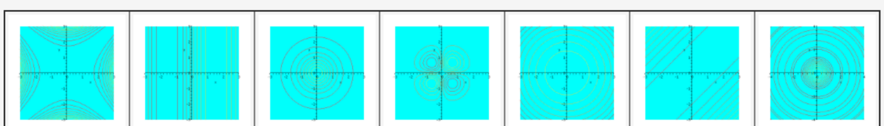
Preview My Answers | Submit Answers

Section 11.1: Problem 6

Previous | Problem List | Next

(1 point) Match the functions with their contour plots labeled A - G. Most of these functions appear in the previous problem, so comparing with the graphs there may help. As always, you may click on the thumbnail image to produce a larger image in a new window (sometimes exactly on top of the old one).

1. $f(x, y) = (x^2 - y^2)^2$
2. $f(x, y) = \sin(x)\sin(y)e^{-x^2-y^2}$
3. $f(x, y) = \cos(x^2 + y^2)/(1 + x^2 + y^2)$
4. $f(x, y) = \sin(x)$
5. $f(x, y) = 3 - x^2 - y^2$
6. $f(x, y) = (x - y)^2$
7. $f(x, y) = 1/(1 + x^2 + y^2)$



A	B	C	D	E	F	G

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.1: Problem 7

Previous | Problem List | Next

(1 point) Match the surfaces with the verbal description of the level curves by placing the letter of the verbal description to the left of the number of the surface.

1. $z = x^2 + y^2$
2. $z = xy$
3. $z = \sqrt{x^2 + y^2}$
4. $z = \sqrt{25 - x^2 - y^2}$
5. $z = 2x + 3y$
6. $z = 2x^2 + 3y^2$
7. $z = \dfrac{1}{x - 1}$

A. a collection of concentric ellipses
B. a collection of equally spaced concentric circles
C. a collection of unequally spaced parallel lines
D. two straight lines and a collection of hyperbolas
E. a collection of equally spaced parallel lines
F. a collection of unequally spaced concentric circles

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.1: Problem 8

Previous | Problem List | Next

(1 point) On a map showing the Superstition mountains, the contour lines are:

- **A.** closely spaced
- **B.** far apart

On a map showing the Bonneville Flats of Utah, the contour lines are:

- **A.** closely spaced
- **B.** far apart

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.1: Problem 9

Previous | Problem List | Next

(1 point) Find an equation for the contour of $f(x, y) = 2x^2y + 5x + 15$ that goes through the point $(4, -1)$.

Equation:

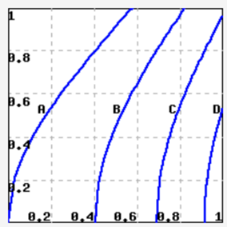
Preview My Answers | Submit Answers

Section 11.1: Problem 10

Previous | Problem List | Next

(1 point)

The figure below shows contours of $f(x, y) = 140e^x - 110y^2$. Find the values of f on the contours. They are equally spaced multiples of 10.



Curve A:

Curve B:

Curve C:

Curve D:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.1: Problem 11

Previous | Problem List | Next

(1 point) Match each of the tables shown below with the contour diagrams below them.

(a)

y\x	−1	0	1
−1	2	1	2
0	1	0	1
1	2	1	2

(b)

y\x	−1	0	1
−1	0	1	0
0	1	2	1
1	0	1	0

(c)

y\x	−1	0	1
−1	2	0	2
0	2	0	2
1	2	0	2

(d)

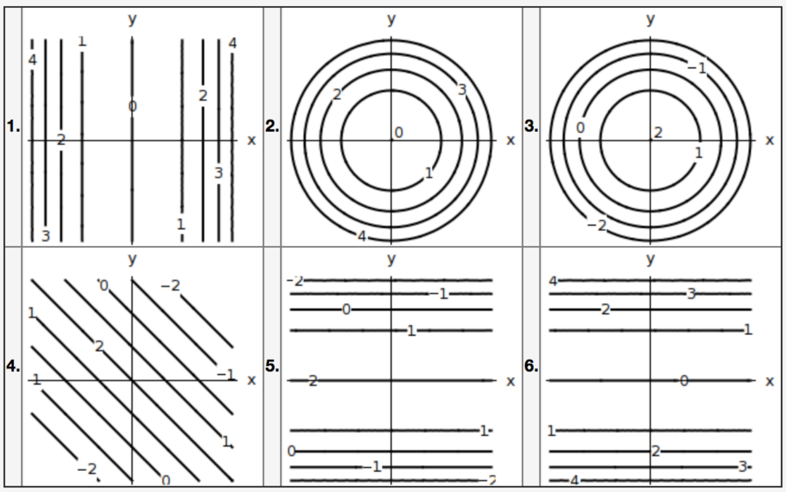
y\x	−1	0	1
−1	2	2	2
0	0	0	0
1	2	2	2

Table **(a)** : graph ?

Table **(b)** : graph ?

Table **(c)** : graph ?

Table **(d)** : graph ?



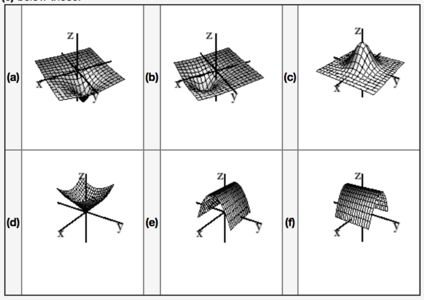
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

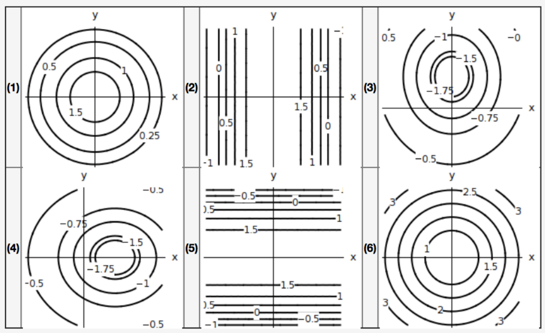
Section 11.1: Problem 12

Previous | Problem List | Next

(1 point) Match the surfaces **(a)** - **(f)** below with the contour diagrams **(1)** - **(6)** below those.



(a) Surface (a) matches contour ?
(b) Surface (b) matches contour ?
(c) Surface (c) matches contour ?
(d) Surface (d) matches contour ?
(e) Surface (e) matches contour ?
(f) Surface (f) matches contour ?



Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

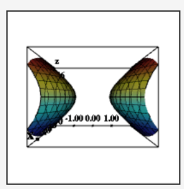
Section 11.1: Problem 13

Previous | Problem List | Next

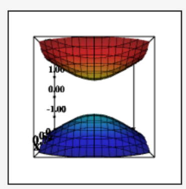
(1 point)
Match the equations below with the pictures of the of the level surfaces they represent.

1. $2y^2 - 3z^2 - x^2 = 1$
2. $2z^2 - 3x^2 - y^2 = 1$
3. $\frac{1}{2}y^2 - 3z^2 - x^2 = -1$
4. $\frac{1}{2}z^2 - 3x^2 - y^2 = -1$

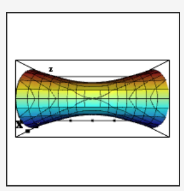
(You can drag the images to rotate them.)



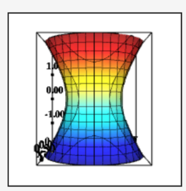
A



B



C



D

Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

Section 11.1: Problem 14

Previous | Problem List | Next

(1 point) Sketch a contour diagram of each function. Then, decide whether its contours are predominantly lines, parabolas, ellipses, or hyperbolas.

? **1.** $z = x^2 - 3y^2$

? **2.** $z = x^2 + 2y^2$

? **3.** $z = -5x^2$

? **4.** $z = y - 3x^2$

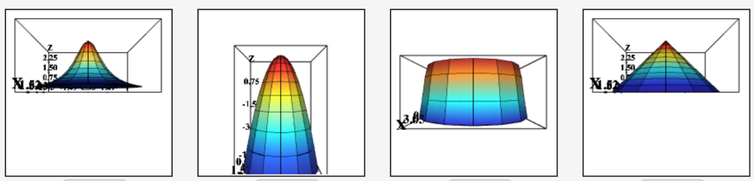
Note: *You can earn 50% partial credit for 2 - 3 correct answers.*

Preview My Answers | Submit Answers

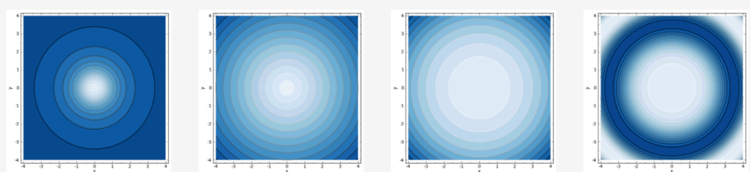
Section 11.1: Problem 15

Previous | Problem List | Next

(1 point) Match each graph with its contour plot. You can rotate each graph by clicking and dragging. If you click on a contour plot, a larger plot will appear in a new window. In the contour plots, darker areas represent lower elevations and lighter areas represent higher elevations.



1. Choose 2. Choose 3. Choose 4. Choose



A B C D

(Click on a graph to enlarge it.)

Note: *You can earn 50% partial credit for 2 - 3 correct answers.*

Preview My Answers | Submit Answers

Section 11.2: Problem 1

Previous | Problem List | Next

(1 point)
Find the limit

$$\lim_{(x,y)\to(-48,8)} xy\cos(x+6y)$$

(Enter 'DNE' if the limit does not exist)

Preview My Answers | Submit Answers

Section 11.2: Problem 2

Previous | Problem List | Next

(1 point)

Find the limit, if it exists, or type 'DNE' if it does not exist.

$$\lim_{(x,y)\to(-5,5)} e^{\sqrt{2x^2+2y^2}} =$$

Preview My Answers | Submit Answers

Section 11.2: Problem 3

Previous | Problem List | Next

(1 point)
Find the limit (enter 'DNE' if the limit does not exist)

$$\lim_{(x,y)\to(0,0)} \frac{(-3x+y)^2}{9x^2+y^2}$$

1) Along the x-axis:

2) Along the y-axis:

3) Along the line y = x :

4) The limit is:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.2: Problem 4

Previous | Problem List | Next

(1 point)

Find the limit, if it exists, or type 'DNE' if it does not exist.

$$\lim_{(x,y)\to(0,0)} \frac{2x^2}{5x^2+3y^2} =$$

1) Along the x-axis:

2) Along the y-axis:

3) Along the line $y = mx$:

4) The limit is:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.2: Problem 5

Previous | Problem List | Next

(1 point)
Find the limit (enter 'DNE' if the limit does not exist)
Hint: rationalize the denominator.

$$\lim_{(x,y)\to(0,0)} \frac{(6x^2-6y^2)}{\sqrt{(6x^2-6y^2+1)}-1}$$

Preview My Answers | Submit Answers

Section 11.2: Problem 6

Previous | Problem List | Next

(1 point)

Find the limit, if it exists, or type **DNE** if it does not exist.

A. $\lim_{(x,y)\to(0,0)} \frac{(x+12y)^2}{x^2+144y^2} =$

B. $\lim_{(x,y)\to(0,0)} \frac{3x^3+3y^3}{x^2+y^2} =$

(Hint for B: use polar coordinates, that is $x = r\cos(\theta), y = r\sin(\theta)$)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.2: Problem 7

Previous | Problem List | Next

(1 point)

Find the limit, if it exists, or type N if it does not exist.

$$\lim_{(x,y,z)\to(1,3,4)} \frac{3ze^{x^2+y^2}}{x^2+3y^2+4z^2} =$$

Preview My Answers | Submit Answers

Section 11.2: Problem 8

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(1 point)

Find the limit, if it exists, or type N if it does not exist.

$$\lim_{(x,y,z)\to(0,0,0)} \frac{4xy+2yz+3xz}{16x^2+4y^2+9z^2} =$$

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Section 11.2: Problem 9

Previous | Problem List | Next

(1 point)
The largest set on which the function $f(x, y) = 1/(13 - x^2 - y^2)$ is continuous is

A. The exterior of the circle $x^2 + y^2 = 13$
B. The interior of the circle $x^2 + y^2 = 13$
C. The interior of the circle $x^2 + y^2 = 13$, plus the circle
D. All of the xy-plane
E. All of the xy-plane except the circle $x^2 + y^2 = 13$

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Section 11.2: Problem 10

Previous | Problem List | Next

(1 point)
The largest set on which the funtion $f(x, y) = \sqrt{x+y} - \sqrt{x-y}$ is continuous is

A. $\{(x, y) | x \geq y\}$
B. $\{(x, y) | -x < y \leq x\}$
C. $\{(x, y) | -x < y < x\}$
D. $\{(x, y) | -x \leq y \leq x\}$
E. the whole xy-plane

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Section 11.3: Problem 1

Previous | Problem List | Next

(1 point) Find the partial derivatives of the function

$$f(x, y) = \frac{5x - 5y}{3x + 9y}$$

$f_x(x, y) =$

$f_y(x, y) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 2

Previous | Problem List | Next

(1 point) Find the first partial derivatives of $f(x, y) = \sin(x - y)$ at the point $(6, 6)$.

A. $f_x(6, 6) =$

B. $f_y(6, 6) =$

Note: *You can earn partial credit on this problem.*

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Section 11.3: Problem 3

Previous | Problem List | Next

(1 point) Find the first partial derivatives of
$f(x, y) = \dfrac{x - 4y}{x + 4y}$ at the point $(x, y) = (4, 4)$.

$\dfrac{\partial f}{\partial x}(4, 4) =$

$\dfrac{\partial f}{\partial y}(4, 4) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 4

Previous | Problem List | Next

(1 point) Find the partial derivatives of the function

$$w = \sqrt{5r^2 + 4s^2 + 8t^2}$$

$\frac{\partial w}{\partial r} =$

$\frac{\partial w}{\partial s} =$

$\frac{\partial w}{\partial t} =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 5

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(1 point) Find the first partial derivatives of $f(x, y, z) = z \arctan\left(\frac{y}{x}\right)$ at the point $(4, 4, -1)$.

A. $\frac{\partial f}{\partial x}(4, 4, -1) =$

B. $\frac{\partial f}{\partial y}(4, 4, -1) =$

C. $\frac{\partial f}{\partial z}(4, 4, -1) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 6

Previous | Problem List | Next

(1 point) The gas law for a fixed mass m of an ideal gas at absolute temperature T, pressure P, and volume V is $PV = mRT$, where R is the gas constant. Find the partial derivatives

$\frac{\partial P}{\partial V} =$

$\frac{\partial V}{\partial T} =$

$\frac{\partial T}{\partial P} =$

$\frac{\partial P}{\partial V}\frac{\partial V}{\partial T}\frac{\partial T}{\partial P} =$ (an integer)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 7

Previous | Problem List | Next

(1 point) Find the partial derivatives of the function

$$f(x, y) = xye^y$$

You should as a by product verify that the function f satisfies Clairaut's theorem.

$f_x(x, y) =$

$f_y(x, y) =$

$f_{xy}(x, y) =$

$f_{yx}(x, y) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 8

Previous | Problem List | Next

(1 point) Find all the first and second order partial derivatives of $f(x, y) = -10\sin(2x + y) - 3\cos(x - y)$.

A. $\frac{\partial f}{\partial x} = f_x =$

B. $\frac{\partial f}{\partial y} = f_y =$

C. $\frac{\partial^2 f}{\partial x^2} = f_{xx} =$

D. $\frac{\partial^2 f}{\partial y^2} = f_{yy} =$

E. $\frac{\partial^2 f}{\partial x \partial y} = f_{yx} =$

F. $\frac{\partial^2 f}{\partial y \partial x} = f_{xy} =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 9

Previous | Problem List | Next

(1 point) If $\sin(5x+5y+z)=0$, find the first partial derivatives $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ at the point (0, 0, 0).

A. $\frac{\partial z}{\partial x}(0,0)=$

B. $\frac{\partial z}{\partial y}(0,0)=$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 10

Previous | Problem List | Next

(1 point) Find the partial derivatives of the function

$$f(x,y)=\int_y^x \cos(1t^2+1t+1)\,dt$$

$f_x(x,y)=$

$f_y(x,y)=$

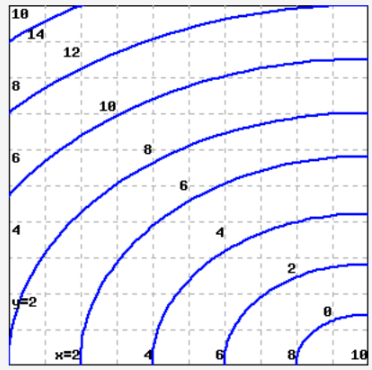
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.3: Problem 11

Previous | Problem List | Next

(1 point) Approximate $f_x(1, 3)$ using the contour diagram of $f(x, y)$ shown below.



$f_x(1, 3) \approx$

Preview My Answers | Submit Answers

Section 11.3: Problem 12

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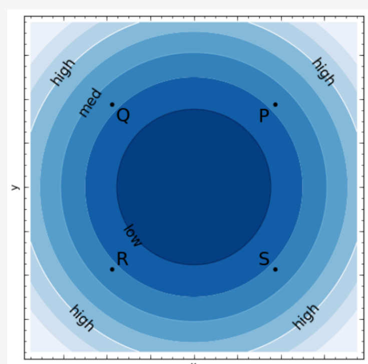
(1 point)
A contour diagram of $z = f(x, y)$ is given in the figure. Determine whether f_x and f_y are positive, negative, or zero at the points P, Q, R, and S.



(Click on graph to enlarge)

? 1. f_y at the point S.

? 2. f_y at the point R.

? 3. f_x at the point S.

? 4. f_y at the point P.

? 5. f_y at the point Q.

? 6. f_x at the point P.

? 7. f_x at the point R.

? 8. f_x at the point Q.

Note: *You can earn 50% partial credit for 4 - 5 correct answers, and 75% partial credit for 6 - 7 correct answers.*

Preview My Answers | Submit Answers

Section 11.4: Problem 1

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(1 point) Find an equation of the tangent plane to the surface $z = 8x^2 + 5y^2 + 9xy$ at the point $(-2, -2, 88)$.

Preview My Answers | Submit Answers

Section 11.4: Problem 2

Previous | Problem List | Next

(1 point) Find the equation of the tangent plane to the surface $z = e^{-3x/17}\ln(3y)$ at the point $(1, 2, 1.50189)$.

Preview My Answers | Submit Answers

Section 11.4: Problem 3

Previous | Problem List | Next

(1 point) Find the linearization of the function $f(x, y) = x\sqrt{y}$ at the point $(-2, 49)$.

$L(x, y) =$

Preview My Answers | Submit Answers

Section 11.4: Problem 4

Previous | Problem List | Next

(1 point) Find the linearization of the function $f(x, y) = \sqrt{30 - 3x^2 - 2y^2}$ at the point $(1, -1)$.

$L(x, y) =$

Use the linear approximation to estimate the value of $f(0.9, -0.9)$

$f(0.9, -0.9) \approx$

Note: *You can earn partial credit on this problem.*

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Section 11.4: Problem 5

Previous | Problem List | Next

(1 point) Suppose that $f(x, y)$ is a smooth function and that its partial derivatives have the values, $f_x(3, 1) = 1$ and $f_y(3, 1) = 2$. Given that $f(3, 1) = -2$, use this information to estimate the following values:

Estimate of (integer value) $f(3, 2)$:

Estimate of (integer value) $f(4, 1)$:

Estimate of (integer value) $f(4, 2)$:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.4: Problem 6

Previous | Problem List | Next

(1 point) Find the differential of the function $w = x^7 \sin(yz^4)$

$dw =$ ____ $dx+$ ____ $dy+$ ____ dz

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.4: Problem 7

Previous | Problem List | Next

(1 point) Use differentials to estimate the amount of material in a closed cylindrical can that is 80 cm high and 32 cm in diameter if the metal in the top and bottom is 0.2 cm thick, and the metal in the sides is 0.1 cm thick.
Note, you are approximating the volume of metal which makes up the can (i.e. melt the can into a blob and measure its volume), not the volume it encloses.

The differential for the volume is

$dV =$ ______ $dr +$ ______ dh (enter your answer in therms of *r* and *h*)

$dr =$ ______ and $dh =$ ______ (be careful)

The approximate volume of material is ______ cm^3.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.4: Problem 8

Previous | Problem List | Next

(1 point) The dimensions of a closed rectangular box are measured as 100 centimeters, 70 centimeters, and 70 centimeters, respectively, with the error in each measurement at most $.2$ centimeters. Use differentials to estimate the maximum error in calculating the surface area of the box.

______ square centimeters

Preview My Answers | Submit Answers

Section 11.5: Problem 1

Previous | Problem List | Next

(1 point) Suppose $w = \frac{x}{y} + \frac{y}{z}$, where
$x = e^{4t}$, $y = 2 + \sin(t)$, and $z = 2 + \cos(4t)$.

1. Use the chain rule to find $\frac{dw}{dt}$ as a function of x, y, z, and t. Do not rewrite x, y, and z in terms of t, and do not rewrite e^{4t} as x.

   $\frac{dw}{dt} =$ ______
   Note: Your answer should be an expression in x, y, z, and t; e.g. "3x - 4y + 2t"

2. Use part 1. to evaluate $\frac{dw}{dt}$ when $t = 0$.

   ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.5: Problem 2

Previous | Problem List | Next

(1 point) Suppose $z = x^2 \sin(y)$, $x = s^2 + 4t^2$, $y = 4st$.

A. Use the chain rule to find $\frac{\partial z}{\partial s}$ and $\frac{\partial z}{\partial t}$ as functions of x, y, s and t.

$\frac{\partial z}{\partial s} =$

$\frac{\partial z}{\partial t} =$

B. Find the numerical values of $\frac{\partial z}{\partial s}$ and $\frac{\partial z}{\partial t}$ when $(s, t) = (-3, 1)$.

$\frac{\partial z}{\partial s}(-3, 1) =$

$\frac{\partial z}{\partial t}(-3, 1) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.5: Problem 3

Previous | Problem List | Next

(1 point) Use the chain rule to find $\frac{\partial z}{\partial s}$ and $\frac{\partial z}{\partial t}$, where

$$z = e^{xy} \tan(y), \; x = 4s + t, \; y = \frac{6s}{4t}$$

First the pieces:

$\frac{\partial z}{\partial x} =$

$\frac{\partial z}{\partial y} =$

$\frac{\partial x}{\partial s} =$

$\frac{\partial x}{\partial t} =$

$\frac{\partial y}{\partial s} =$

$\frac{\partial y}{\partial t} =$

And putting it all together:

$\frac{\partial z}{\partial s} = \frac{\partial z}{\partial x}\frac{\partial x}{\partial s} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial s}$ and $\frac{\partial z}{\partial t} = \frac{\partial z}{\partial x}\frac{\partial x}{\partial t} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial t}$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.5: Problem 4

Previous | Problem List | Next

(1 point) Let

$$w = 2xy + 4yz + 3xz, \ \ x = st, \ \ y = e^{st}, \ \ z = t^2$$

Compute

$\frac{\partial w}{\partial s}(2, 4) =$ ______

$\frac{\partial w}{\partial t}(2, 4) =$ ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.5: Problem 5

Previous | Problem List | Next

(1 point) Let $W(s, t) = F(u(s, t), v(s, t))$ where

$$u(1, 0) = -2, u_s(1, 0) = 8, u_t(1, 0) = 6$$

$$v(1, 0) = -2, v_s(1, 0) = 1, v_t(1, 0) = 4$$

$$F_u(-2, -2) = 3, F_v(-2, -2) = 3$$

$W_s(1, 0) =$ ______ $W_t(1, 0) =$ ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.5: Problem 6

Previous | Problem List | Next

(1 point) Consider the curve $x^6 + 2xy + y^2 = 4$
The equation of the tangent line to the curve at the point $(1, 1)$ has the form $y = mx + b$ where
$m =$ ______ and $b =$ ______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.5: Problem 7

Previous | Problem List | Next

(1 point) Consider the surface $F(x, y, z) = x^2z^3 + \sin(y^6z^3) + 4 = 0.$

Find the following partial derivatives

$\frac{\partial z}{\partial x} =$

$\frac{\partial z}{\partial y} =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.5: Problem 8

Previous | Problem List | Next

(1 point) The radius of a right circular cone is increasing at a rate of 4 inches per second and its height is decreasing at a rate of 2 inches per second. At what rate is the volume of the cone changing when the radius is 10 inches and the height is 30 inches?

NOTE: The volume of a cone with base radius r and height h is given by $V = \frac{1}{3}\pi r^2 h$.

cubic inches per second

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Section 11.5: Problem 9

Previous | Problem List | Next

(1 point) In a simple electric circuit, Ohm's law states that $V = IR$, where V is the voltage in Volts, I is the current in Amperes, and R is the resistance in Ohms. Assume that, as the battery wears out, the voltage decreases at 0.02 Volts per second and, as the resistor heats up, the resistance is increasing at 0.01 Ohms per second. When the resistance is 300 Ohms and the current is 0.03 Amperes, at what rate is the current changing?

Amperes per second

Preview My Answers | Submit Answers

Section 11.6: Problem 1

Previous | Problem List | Next

(1 point) Find the directional derivative of $f(x, y) = x^2y^3 + 2x^4y$ at the point $(4, 1)$ in the direction $\theta = 2\pi/3$.

The gradient of f is:

$\nabla f(x, y) = \langle$ ___ , ___ $\rangle$

$\nabla f(4, 1) = \langle$ ___ , ___ $\rangle$

The directional derivative is:

___

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 2

Previous | Problem List | Next

(1 point) Consider the function $f(x, y, z) = xy + yz^2 + xz^3$.

Find the gradient of f:

$\langle$ ___ , ___ , ___ $\rangle$

Find the gradient of f at the point $(2, 4, 5)$.

$\langle$ ___ , ___ , ___ $\rangle$

Find the rate of change of the function f at the point $(2, 4, 5)$ in the direction $\mathbf{u} = \langle -4/\sqrt{33}, -4/\sqrt{33}, 1/\sqrt{33} \rangle$.

___

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 3

Previous | Problem List | Next

(1 point) Find the directional derivative of $f(x, y, z) = z^3 - x^2y$ at the point $(4, 5, -4)$ in the direction of the vector $\mathbf{v} = \langle 2, -1, -5 \rangle$.

___

Preview My Answers | Submit Answers

Section 11.6: Problem 4

Previous | Problem List | Next

(1 point) Find the directional derivative of $f(x, y, z) = 5x^2 - 4y^2 + z^2$ at the point $P = (-5, -1, -3)$ in the direction of the origin.

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Section 11.6: Problem 5

Previous | Problem List | Next

(1 point) Find the maximum rate of change of $f(x, y, z) = x + \frac{y}{z}$ at the point $(2, -2, -1)$ and the direction in which it occurs.

Maximum rate of change:

Direction in which it occurs:)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 6

Previous | Problem List | Next

(1 point) Find the maximum rate of change of $f(x, y) = \ln(x^2 + y^2)$ at the point $(-3, -4)$ and the direction in which it occurs.

Maximum rate of change:

Direction in which it occurs:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 7

Previous | Problem List | Next

(1 point) Consider the function $f(x, y) = x^2 + 2y^2$.
Find the the directional derivative of f at the point $(-4, -2)$ in the direction given by the angle $\theta = \frac{1}{2}\pi$.

Find the vector which describes the direction in which f is increasing most rapidly at $(-4, -2)$.

.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 8

Previous | Problem List | Next

(1 point) Suppose $f(x, y) = \frac{x}{y}$, $P = (-4, 2)$ and $\mathbf{v} = 4\mathbf{i} + 1\mathbf{j}$.

1. Find the gradient of f.
   $\nabla f(x, y) =$ ____ $\mathbf{i}+$ ____ $\mathbf{j}$
2. Find the gradient of f at the point P.
   $\nabla f(P) =$ ____ $\mathbf{i}+$ ____ $\mathbf{j}$
3. Find the directional derivative of f at P in the direction of $\mathbf{v}$.
   $D_u f(P) =$ ____
4. Find the maximum rate of change of f at P.
   ____
5. Find the (unit) direction vector in which the maximum rate of change occurs at P.
   ____ $\mathbf{i}+$ ____ $\mathbf{j}$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 9

Previous | Problem List | Next

(1 point) Suppose that you are climbing a hill whose shape is given by $z = 854 - 0.1x^2 - 0.04y^2$, and that you are at the point $(70, 40, 300)$.

In which direction should you proceed initially in order to reach the top of the hill fastest?

If you climb in that direction, at what angle above the horizontal will you be climbing initially (radian measure)?

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 10

Previous | Problem List | Next

(1 point) Consider a function $f(x, y)$ at the point $(5, 5)$.
At that point the function has directional derivatives:
$\frac{6}{\sqrt{61}}$ in the direction (parallel to) $\langle 6, 5 \rangle$, and
$\frac{5}{\sqrt{61}}$ in the direction (parallel to) $\langle 5, 6 \rangle$.
The gradient of f at the point $(5, 5)$ is
(,).

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 11

Previous | Problem List | Next

(1 point) Consider the surface $x = y^2 + 2z^2 - 113$.

Find an equation of the tangent plane to the surface at the point $(10, -5, 7)$.

.

Find a vector equation of the normal line to the surface at $(10, -5, 7)$

$\mathbf{r}(t) =$.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 12

Previous | Problem List | Next

(1 point) Consider the surface $z + 7 = xe^y \cos z$.

Find an equation of the tangent plane to this surface at $(7, 0, 0)$.

Find a vector equation for the normal line to the surface at $(7, 0, 0)$.

$\mathbf{r}(t) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 13

Previous | Problem List | Next

(1 point) Frodo and Sam are studying a topographic map of Mordor. Place the letter describing contour lines on a map to the left of the number describing a possible goal.

1. If Frodo and Sam want to find Mount Doom, they should look for:

2. If Frodo and Sam want to find the River Anduin, they should look for:

3. If Frodo and Sam want to find a level route, they should look at:

4. If Frodo and Sam want to go directly uphill, they should go:

A. Concentric contour lines
B. Perpendicular to the contour lines
C. Single contour lines
D. Parallel contour lines

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 14

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(1 point) You are standing above the point $(3, 5)$ on the surface $z = 25 - (x^2 + y^2)$.

(a) In which direction should you walk to descend fastest? (Give your answer as a unit 2-vector.)

direction =

(b) If you start to move in this direction, what is the slope of your path?

slope =

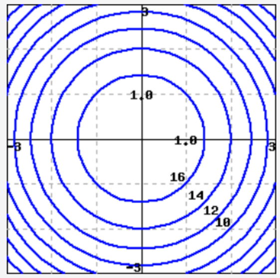
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 15

Previous | Problem List | Next

(1 point) Use the contour diagram of f in the figure below to decide if the specified directional derivatives below are positive, negative, or approximately zero.



(a) At point $(-2, 2)$, in direction $-\vec{i}$: $f_{\vec{u}}$ is ?

(b) At point $(0, -2)$, in direction $\vec{j}$: $f_{\vec{u}}$ is ?

(c) At point $(-1, 1)$, in direction $-\vec{i} + \vec{j}$: $f_{\vec{u}}$ is ?

(d) At point $(-1, 1)$, in direction $\vec{i} + \vec{j}$: $f_{\vec{u}}$ is ?

(e) At point $(0, -2)$, in direction $\vec{i} + 2\vec{j}$: $f_{\vec{u}}$ is ?

(f) At point $(0, -2)$, in direction $\vec{i} - 2\vec{j}$: $f_{\vec{u}}$ is ?

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 16

Previous | Problem List | Next

(1 point) A car is driving northwest at v mph across a sloping plain whose height, in feet above sea level, at a point N miles north and E miles east of a city is given by

$$h(N, E) = 2250 + 175N + 50E.$$

(a) At what rate is the height above sea level changing with respect to distance in the direction the car is driving?

rate =

(b) Express the rate of change of the height of the car with respect to time in terms of v.

rate =

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 17

Previous | Problem List | Next

(1 point) You are climbing a mountain by the steepest route at a slope of 15° when you come upon a trail branching off at a 15° angle from yours. What is the angle of ascent of the branch trail?

angle = (in degrees)

Preview My Answers | Submit Answers

Section 11.6: Problem 18

Previous | Problem List | Next

(1 point) The temperature at any point in the plane is given by $T(x,y) = \dfrac{160}{x^2+y^2+3}$.

(a) What shape are the level curves of T?

- **A.** ellipses
- **B.** lines
- **C.** circles
- **D.** hyperbolas
- **E.** parabolas
- **F.** none of the above

(b) At what point on the plane is it hottest?

What is the maximum temperature?

(c) Find the direction of the greatest increase in temperature at the point $(-2,-2)$.

What is the value of this maximum rate of change, that is, the maximum value of the directional derivative at $(-2,-2)$?

(d) Find the direction of the greatest decrease in temperature at the point $(-2,-2)$.

What is the value of this most negative rate of change, that is, the minimum value of the directional derivative at $(-2,-2)$?

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.6: Problem 19

Previous | Problem List | Next

(1 point) At a certain point on a heated metal plate, the greatest rate of temperature increase, 5 degrees Celsius per meter, is toward the northeast. If an object at this point moves directly north, at what rate is the temperature increasing?

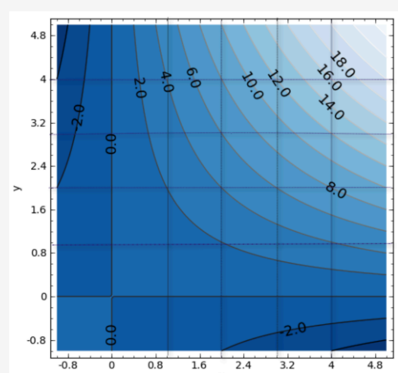
degrees Celsius per meter

Preview My Answers | Submit Answers

Section 11.6: Problem 20

Previous | Problem List | Next

(1 point)
Use the contour diagram for $f(x,y)$ shown below to estimate the directional derivative of f in the direction $\vec{v}$ at the point P.



(Click on graph to enlarge)

(a) At the point $P = (2,2)$ in the direction $\vec{v} = \vec{j}$, the directional derivative is approximately

(b) At the point $P = (3,2)$ in the direction $\vec{v} = -\vec{i}$, the directional derivative is approximately

(c) At the point $P = (4,1)$ in the direction $\vec{v} = (\vec{i}+\vec{j})/\sqrt{2}$, the directional derivative is approximately

(d) At the point $P = (2,0)$ in the direction $\vec{v} = -\vec{i}$, the directional derivative is approximately

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 1

Previous | Problem List | Next

(1 point) The function f has continuous second derivatives, and a critical point at $(10, -3)$. Suppose $f_{xx}(10, -3) = -2,\ f_{xy}(10, -3) = 0,\ f_{yy}(10, -3) = 8$. Then the point $(10, -3)$:

- **A.** is a saddle point
- **B.** is a local maximum
- **C.** cannot be determined
- **D.** is a local minimum
- **E.** None of the above

Preview My Answers | Submit Answers

Section 11.7: Problem 2

Previous | Problem List | Next

(1 point)
The function f has continuous second derivatives, and a critical point at $(3, -7)$. Suppose $f_{xx}(3, -7) = 9,\ f_{xy}(3, -7) = -3,\ f_{yy}(3, -7) = 10$. Then the point $(3, -7)$:

- **A.** is a local maximum
- **B.** cannot be determined
- **C.** is a local minimum
- **D.** is a saddle point
- **E.** None of the above

Preview My Answers | Submit Answers

Section 11.7: Problem 3

Previous | Problem List | Next

(1 point) Each of the following functions has at most one critical point. Graph a few level curves and a few gradiants and, on this basis alone, decide whether the critical point is a local maximum (MA), a local minimum (MI), or a saddle point (S). Enter the appropriate abbreviation for each question, or N if there is no critical point.

1. $f(x, y) = e^{-4x^2-2y^2}$
   Type of critical point:
2. $f(x, y) = e^{4x^2-2y^2}$
   Type of critical point:
3. $f(x, y) = 4x^2 + 2y^2 + 4$
   Type of critical point:
4. $f(x, y) = 4x + 2y + 4$
   Type of critical point:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 4

Previous | Problem List | Next

(1 point) Suppose $f(x, y) = x^2 + y^2 - 8x - 4y + 2$

(A) How many critical points does f have in $\mathbf{R}^2$?

(B) If there is a local minimum, what is the value of the discriminant D at that point? If there is none, type N.

(C) If there is a local maximum, what is the value of the discriminant D at that point? If there is none, type N.

(D) If there is a saddle point, what is the value of the discriminant D at that point? If there is none, type N.

(E) What is the maximum value of f on $\mathbf{R}^2$? If there is none, type N.

(F) What is the minimum value of f on $\mathbf{R}^2$? If there is none, type N.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 5

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(1 point) Consider the function

$$f(x, y) = y\sqrt{x} - y^2 - 2x + 7y.$$

Find and classify all critical points of the function in the interior of its domain. If there are more blanks than critical points, leave the remaining entries blank.

$f_x =$

$f_y =$

$f_{xx} =$

$f_{xy} =$

$f_{yy} =$

The critical point with the smallest x-coordinate is

(,) Classification: (local minimum, local maximum, saddle point, cannot be determined)

The critical point with the next smallest x-coordinate is

(,) Classification: (local minimum, local maximum, saddle point, cannot be determined)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 6

Previous | Problem List | Next

(1 point) Suppose $f(x, y) = xy(1 - x - 5y)$.
$f(x, y)$ has 4 critical points. List them in increasing lexographic order. By that we mean that (x, y) comes before (z, w) if $x < z$ or if $x = z$ and $y < w$. Also, determine whether the critical point a local maximum, a local minimim, or a saddle point.

First point (____ , ____).
Classification: ____ (local minimum, local maximum, saddle point, cannot be determined).

Second point (____ , ____).
Classification: ____ (local minimum, local maximum, saddle point, cannot be determined).

Third point (____ , ____) .
Classification: ____ (local minimum, local maximum, saddle point, cannot be determined).

Fourth point (____ , ____).
Classification: ____ (local minimum, local maximum, saddle point, cannot be determined).

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 7

Previous | Problem List | Next

(1 point) Consider the function $f(x, y) = xy - 6y - 36x + 216$ on the region on or above $y = x^2$ and on or below $y = 37$.

Find the absolute minimum value: ____

Find the points at which the absolute minimum value is attained. List your answer sas points in the form (a, b).

____ .

Find the absolute maximum value: ____

Find the points at which the absolute maximum value is attained. List your answers as points in the form (a, b)

____ .

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 8

Previous | Problem List | Next

(1 point) Consider the function $f(x,y) = 2x^3 + y^4$ on the region $\{(x,y) \mid x^2 + y^2 \leq 16\}$.

Find the absolute minimum value:

Find the point(s) at which the absolute minimum is attained.
List your answer as comma separated list, e.g. (1, 1), (2,3)

).

Find the absolute maximum value:

Find the point(s) at which the absolute maximum is attained.
List your answer as comma separated list, e.g. (1,1), (2,3)

).

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 9

Previous | Problem List | Next

(1 point) Find the coordinates of the point (x, y, z) on the plane $z = 4x + 2y + 2$ which is closest to the origin.

$x =$

$y =$

$z =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 10

Previous | Problem List | Next

(1 point) Find the point(s) on the surface $z^2 = xy + 1$ which are closest to the point $(4, 2, 0)$.
List points as a comma-separated list, (e.g., (1,1,-1), (2, 0, -1), (2,0, 3)).

Preview My Answers | Submit Answers

Section 11.7: Problem 11

Previous | Problem List | Next

(1 point) Find the volume of the largest rectangular box in the first octant with three faces in the coordinate planes, and one vertex in the plane $x + 4y + 5z = 20$.

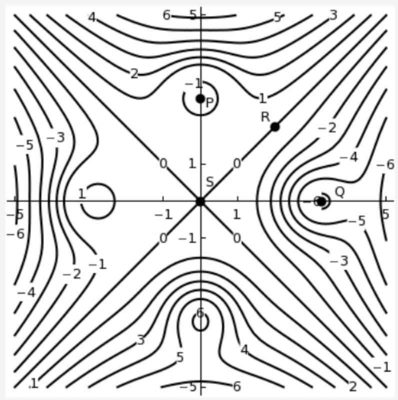
Largest volume is

Preview My Answers | Submit Answers

Section 11.7: Problem 12

Previous | Problem List | Next

(1 point) The contours of a function f are shown in the figure below.



For each of the points shown, indicate whether you think it is a local maximum, local minimum, saddle point, or none of these.

(a) Point P is ?

(b) Point Q is ?

(c) Point R is ?

(d) Point S is ?

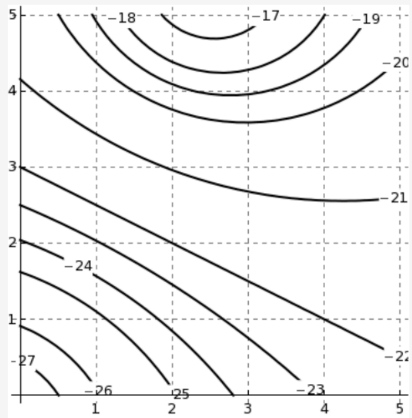
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 13

Previous | Problem List | Next

(1 point) A contour diagram for a function $f(x, y)$ is shown below.



Estimate the position and approximate value of the global maximum and global minimum on the region shown.

Global maximum at ______ of ______

Global minimum at ______ of ______

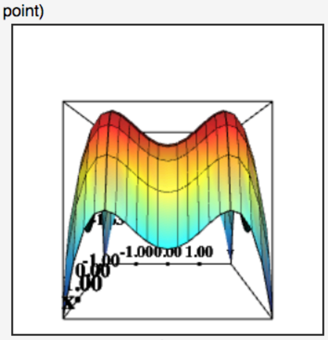
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 11.7: Problem 14

Previous | Problem List | Next

(1 point)



Drag the surface to rotate it

Indicate the number of each type of critical point for the surface shown at the left.

______ relative maxima

______ relative minima

______ saddle points

Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

Section 11.7: Problem 15

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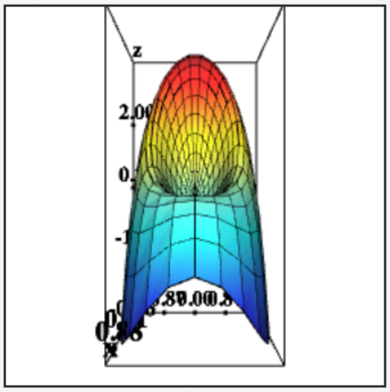
(1 point)



Drag the surface to rotate it

Indicate the number of each type of critical point for the surface shown at the left.

[ ] relative maxima

[ ] relative minima

[ ] saddle points

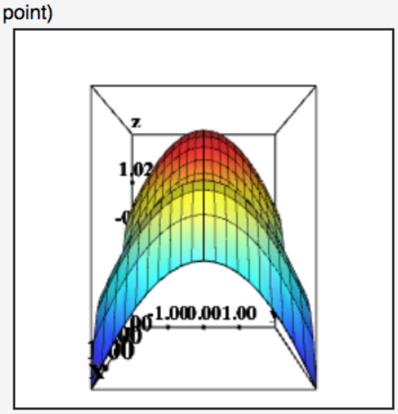
Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

Section 11.7: Problem 16

Previous | Problem List | Next

(1 point)



Drag the surface to rotate it

Indicate the number of each type of critical point for the surface shown at the left.

[ ] relative maxima

[ ] relative minima

[ ] saddle points

Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

Section 12.1: Problem 1

Previous | Problem List | Next

(1 point) Consider the solid that lies above the square (in the xy-plane) $R = [0,2] \times [0,2]$,
and below the elliptic paraboloid $z = 49 - x^2 - 2y^2$.

(A) Estimate the volume by dividing R into 4 equal squares and choosing the sample points to lie in the lower left hand corners.

(B) Estimate the volume by dividing R into 4 equal squares and choosing the sample points to lie in the upper right hand corners.

(C) What is the average of the two answers from (A) and (B)?

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.1: Problem 2

Previous | Problem List | Next

(1 point) Using geometry, calculate the volume of the solid under $z = \sqrt{16 - x^2 - y^2}$ and over the circular disk $x^2 + y^2 \leq 16$.

Preview My Answers | Submit Answers

Section 12.1: Problem 3

Previous | Problem List | Next

(1 point) Evaluate the iterated integral $\int_0^4 \int_0^4 3x^2y^3 \, dxdy$

Preview My Answers | Submit Answers

Section 12.1: Problem 4

Previous | Problem List | Next

(1 point) Evaluate the iterated integral $\int_3^4 \int_4^5 (4x+y)^{-2}\, dy dx$

Preview My Answers | Submit Answers

Section 12.1: Problem 5

Previous | Problem List | Next

(1 point) Evaluate the integral $\int_0^{\pi/6} \int_1^5 (y\cos x - 4)\, dy dx.$

Preview My Answers | Submit Answers

Section 12.1: Problem 6

Previous | Problem List | Next

(1 point) Find $\int_3^4 \int_5^7 xye^{x+y}\, dy dx$

Preview My Answers | Submit Answers

Section 12.1: Problem 7

Previous | Problem List | Next

(1 point) Find $\int_3^8 \int_2^3 (x + \ln y)\, dy dx$

Preview My Answers | Submit Answers

Section 12.1: Problem 8

Previous | Problem List | Next

(1 point) Calculate the double integral $\int\int_{\mathbf{R}} x\cos(4x + y)\, dA$ where $\mathbf{R}$ is the region: $0 \leq x \leq \frac{1}{6}\pi, 0 \leq y \leq \frac{1}{2}\pi$

Preview My Answers | Submit Answers

Section 12.1: Problem 9

Previous | Problem List | Next

(1 point) Consider the solid that lies above the square (in the xy-plane) $R = [0, 2] \times [0, 2]$, and below the elliptic paraboloid $z = 100 - x^2 - 4y^2$.

Using iterated integrals, compute the exact value of the volume.

Preview My Answers | Submit Answers

Section 12.1: Problem 10

Previous | Problem List | Next

(1 point) Find the average value of $f(x, y) = 8e^y \sqrt{x + e^y}$ over the rectangle $R = [0, 3] \times [0, 2]$.

Average value =

Preview My Answers | Submit Answers

Section 12.1: Problem 11

Previous | Problem List | Next

(1 point) The table below gives values of $f(x, y)$, the number of milligrams of mosquito larvae per square meter in a swamp.

	$x = 0$	$x = 5$	$x = 10$
$y = 0$	1	2	4
$y = 4$	2	4	7
$y = 8$	4	7	12

If x and y are in meters and R is the rectangle $0 \le x \le 10$, $0 \le y \le 8$, estimate $\int_R f(x, y)dA$.

$\int_R f(x, y)dA \approx$

(Include units in your answer.)

Hint: Evaluate the Riemann sums using the lower left corners and upper right corners. Then take the average of the two Riemann sums.

Preview My Answers | Submit Answers

Section 12.1: Problem 12

Previous | Problem List | Next

(1 point)

Calculate a Riemann sum $S_{3,3}$ on the square $\mathcal{R} = [0, 3] \times [0, 3]$ for the function $g(x, y) = f(x, y) + 7$.

The contour plot of $f(x, y)$ is shown in Figure 4.

Choose sample points and use the plot to find the values of $f(x, y)$ at these points.

Use the values of $f(x, y)$ to evaluate $g(x, y)$ accordingly.

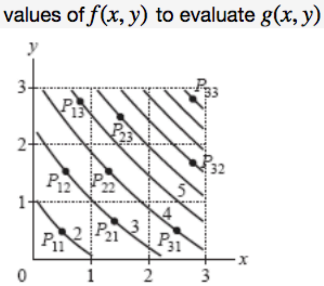


FIGURE 4 Contour plot of $f(x, y)$.

$S_{3,3} =$

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Section 12.2: Problem 1

Previous | Problem List | Next

(1 point) Evaluate the iterated integral $I = \int_0^1 \int_{1-x}^{1+x} (18x^2 + 16y)\, dydx$

Preview My Answers | Submit Answers

Section 12.2: Problem 2

Previous | Problem List | Next

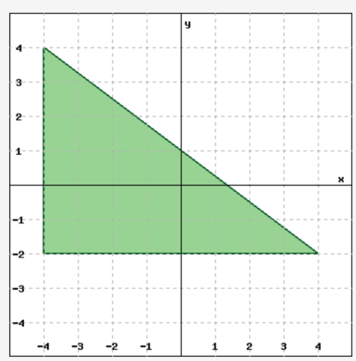
(1 point) Evaluate the iterated integral $I = \int_0^1 \int_{1-y}^{1+y} (24y^2 + 2x)\, dxdy$

Preview My Answers | Submit Answers

Section 12.2: Problem 3

Previous | Problem List | Next

(1 point)
Suppose R is the shaded region in the figure, and $f(x, y)$ is a continuous function on R. Find the limits of integration for the following iterated integrals.



(a) $\iint_R f(x, y)\, dA = \int_A^B \int_C^D f(x, y)\, dy\, dx$

A=

B=

C=

D=

(b) $\iint_R f(x, y)\, dA = \int_E^F \int_G^H f(x, y)\, dx\, dy$

E=

F=

G=

H=

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 4

Previous | Problem List | Next

(1 point) Find the volume of the solid bounded by the planes $x = 0, y = 0, z = 0$, and $x + y + z = 7$.

Preview My Answers | Submit Answers

Section 12.2: Problem 5

Previous | Problem List | Next

(1 point) Consider the integral $\int_0^1 \int_{12x}^{12} f(x, y)dydx$. Sketch the region of integration and change the order of integration.

$$\int_a^b \int_{g_1(y)}^{g_2(y)} f(x, y)dxdy$$

$a =$ $b =$

$g_1(y) =$ $g_2(y) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 6

Previous | Problem List | Next

(1 point) Consider the integral $\int_0^{16} \int_0^{8\sqrt{x}} f(x, y)dydx$. Sketch the region of integration and change the order of integration.

$$\int_a^b \int_{g_1(y)}^{g_2(y)} f(x, y)dxdy$$

$a =$ $b =$

$g_1(y) =$ $g_2(y) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 7

Previous | Problem List | Next

(1 point) Consider the integral $\int_0^5 \int_0^{\sqrt{25-y}} f(x,y)dxdy$. If we change the order of integration we obtain the sum of two integrals:

$$\int_a^b \int_{g_1(x)}^{g_2(x)} f(x,y)dydx + \int_c^d \int_{g_3(x)}^{g_4(x)} f(x,y)dydx$$

$a =$ ____ $b =$ ____

$g_1(x) =$ ____ $g_2(x) =$ ____

$c =$ ____ $d =$ ____

$g_3(x) =$ ____ $g_4(x) =$ ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 8

Previous | Problem List | Next

(1 point) Consider the integral $\int_1^{11} \int_0^{6\ln x} f(x,y)dydx$. Sketch the region of integration and change the order of integration.

$$\int_a^b \int_{g_1(y)}^{g_2(y)} f(x,y)dxdy$$

$a =$ ____ $b =$ ____

$g_1(y) =$ ____ $g_2(y) =$ ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 9

Previous | Problem List | Next

(1 point) In evaluating a double integral over a region D, a sum of iterated integrals was obtained as follows:

$$\iint_D f(x,y)\, dA = \int_0^7 \int_0^{\frac{4}{7}y} f(x,y)\, dxdy + \int_7^{11} \int_0^{11-y} f(x,y)\, dxdy\,.$$

Sketch the region D and express the double integral as an iterated integral with reversed order of integration.

$$\int_a^b \int_{g_1(x)}^{g_2(x)} f(x,y)\, dydx$$

$a =$ ____ $b =$ ____

$g_1(x) =$ ____ $g_2(x) =$ ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 10

Previous | Problem List | Next

(1 point) Evaluate the integral by reversing the order of integration.

$$\int_0^1 \int_{2y}^2 e^{x^2}\, dxdy =$$

Preview My Answers | Submit Answers

Section 12.2: Problem 11

Previous | Problem List | Next

(1 point)

Consider the following integral. Sketch its region of integration in the xy-plane.

$$\int_0^2 \int_{y^2}^4 y \sin(x^2)\; dx\, dy$$

(a) Which graph shows the region of integration in the xy-plane? ?

(b) Write the integral with the order of integration reversed:

$$\int_0^2 \int_{y^2}^4 y \sin(x^2)\; dx\, dy = \int_A^B \int_C^D y \sin(x^2)\; dy\, dx$$

with limits of integration

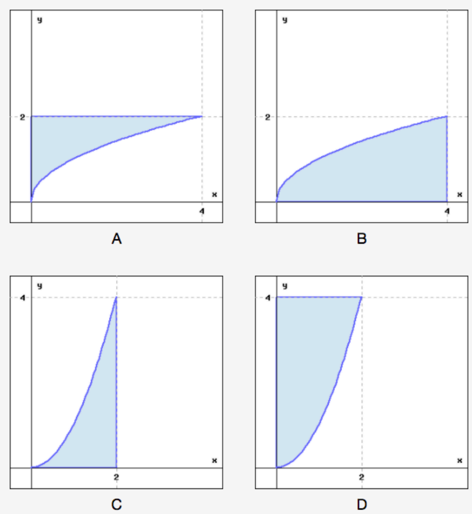
A =

B =

C =

D =

(c) Evaluate the integral.



(Click on a graph to enlarge it)

Preview My Answers | Submit Answers

Section 12.2: Problem 12

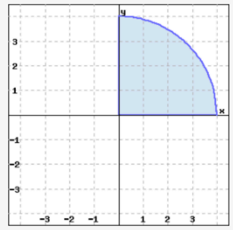
Previous | Problem List | Next

(1 point)
Consider the following integral. Sketch its region of integration in the xy-plane.

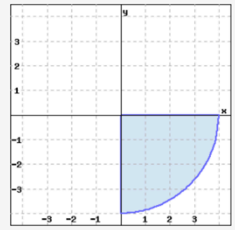
$$\int_{-4}^{0}\int_{-\sqrt{16-x^2}}^{0} 2xy\,dy\,dx$$

(a) Which graph shows the region of integration in the xy-plane? ?

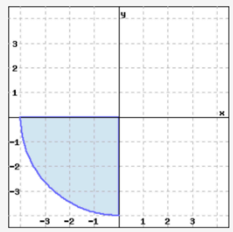
(b) Evaluate the integral.



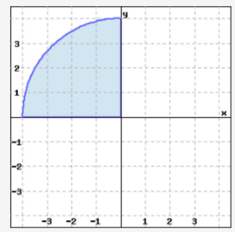
A



B



C



D

(Click on a graph to enlarge it)

Preview My Answers | Submit Answers

Section 12.2: Problem 13

Previous | Problem List | Next

(1 point) Set up a double integral in rectangular coordinates for calculating the volume of the solid under the graph of the function $f(x, y) = 40 - x^2 - y^2$ and above the plane $z = 4$.

Instructions: Please enter the integrand in the first answer box. Depending on the order of integration you choose, enter *dx* and *dy* in either order into the second and third answer boxes with only one *dx* or *dy* in each box. Then, enter the limits of integration.

$$\int_{A}^{B}\int_{C}^{D}$$

A =

B =

C =

D =

Preview My Answers | Submit Answers

Section 12.2: Problem 14

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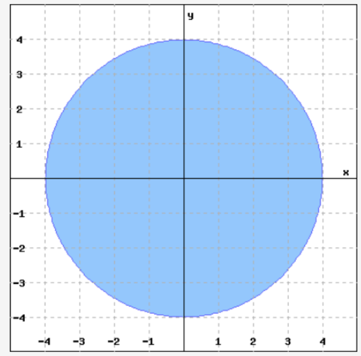
(1 point)
Suppose R is the shaded region in the figure, and $f(x, y)$ is a continuous function on R. Find the limits of integration for the following iterated integrals.



(a) $\iint_R f(x,y)\,dA = \int_A^B \int_C^D f(x,y)\,dy\,dx$

A=

B=

C=

D=

(b) $\iint_R f(x,y)\,dA = \int_E^F \int_G^H f(x,y)\,dx\,dy$

E=

F=

G=

H=

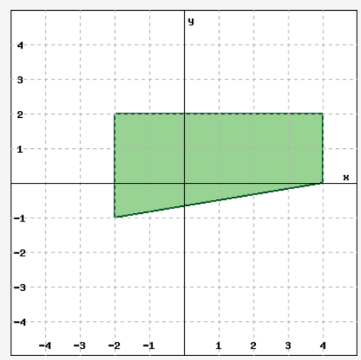
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 15

Previous | Problem List | Next

(1 point)
Suppose R is the shaded region in the figure, and $f(x, y)$ is a continuous function on R. Find the limits of integration for the following iterated integral.



(a) $\iint_R f(x,y)\,dA = \int_A^B \int_C^D f(x,y)\,dy\,dx$

A=

B=

C=

D=

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.2: Problem 16

(1 point)
Consider the following integral. Sketch its region of integration in the xy-plane.

$$\int_0^2 \int_{e^y}^{e^2} \frac{x}{\ln(x)}\,dx\,dy$$

(a) Which graph shows the region of integration in the xy-plane? ?

(b) Write the integral with the order of integration reversed:

$$\int_0^2 \int_{e^y}^{e^2} \frac{x}{\ln(x)}\,dx\,dy = \int_A^B \int_C^D \frac{x}{\ln(x)}\,dy\,dx$$

with limits of integration

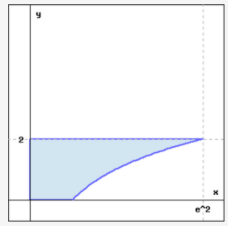
A =

B =

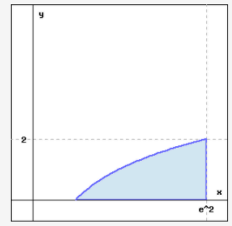
C =

D =

(c) Evaluate the integral.



A



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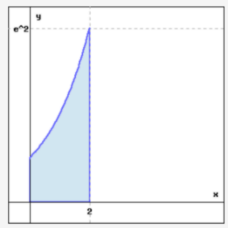

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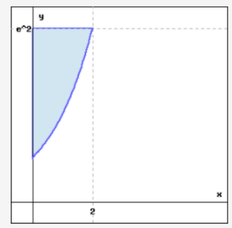


D

(Click on a graph to enlarge it)

Preview My Answers | Submit Answers

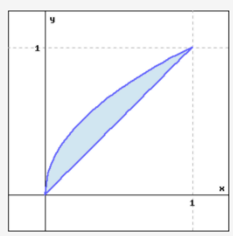
Section 12.2: Problem 17

(1 point)
Consider the following integral. Sketch its region of integration in the xy-plane.

$$\int_0^1 \int_{\sqrt{y}}^{y} 140x^3y^2\,dx\,dy$$

(a) Which graph shows the region of integration in the xy-plane? ?

(b) Evaluate the integral.



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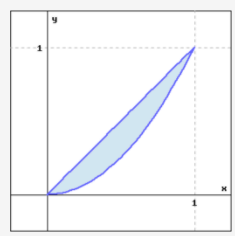


B

(Click on a graph to enlarge it)

Preview My Answers | Submit Answers

Section 12.2: Problem 18

(1 point) Find the volume of the region under the graph of $f(x,y) = 5x + y + 1$ and above the region $y^2 \le x, 0 \le x \le 9$.

volume =

Preview My Answers | Submit Answers

Section 12.3: Problem 1

Previous | Problem List | Next

(1 point) Using polar coordinates, evaluate the integral $\int\int_R \sin(x^2+y^2)dA$ where R is the region $9 \le x^2+y^2 \le 36$.

Preview My Answers | Submit Answers

Section 12.3: Problem 2

Previous | Problem List | Next

(1 point) By changing to polar coordinates, evaluate the integral
$\iint_D (x^2+y^2)^{11/2} dA$ where D is the disk $x^2+y^2 \le 4$.

The value is ______ .

Preview My Answers | Submit Answers

Section 12.3: Problem 3

Previous | Problem List | Next

(1 point) Use polar coordinates to find the volume of a sphere of radius 8.

Preview My Answers | Submit Answers

Section 12.3: Problem 4

Previous | Problem List | Next

(1 point) Find the volume of the ellipsoid $x^2 + y^2 + 10z^2 = 16$.

Preview My Answers | Submit Answers

You have attempted this problem 0 times.

Section 12.3: Problem 5

Previous | Problem List | Next

(1 point) Find the volume of the solid enclosed by the paraboloids $z = 4\left(x^2 + y^2\right)$ and $z = 18 - 4\left(x^2 + y^2\right)$.

Preview My Answers | Submit Answers

Section 12.3: Problem 6

Previous | Problem List | Next

(1 point) A cylindrical drill with radius 1 is used to bore a hole through the center of a sphere of radius 6. Find the volume of the ring shaped solid that remains.

Preview My Answers | Submit Answers

Section 12.3: Problem 7

Previous | Problem List | Next

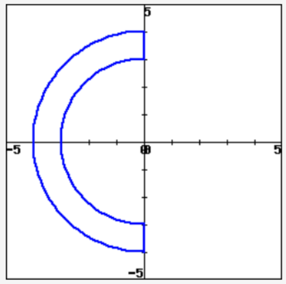
(1 point) A volcano fills the volume between the graphs $z = 0$ and $z = \dfrac{1}{\left(x^2 + y^2\right)^5}$, and outside the cylinder $x^2 + y^2 = 1$. Find the volume of this volcano.

Preview My Answers | Submit Answers

Section 12.3: Problem 8

Previous | Problem List | Next

(1 point) For the region R below, write $\iint_R f\, dA$ as an iterated integral in polar coordinates.



With $a =$ ____ , $b =$ ____ , $c =$ ____ , and $d =$ ____ ,

$\iint_R f\, dA = \int_a^b \int_c^d f\, dA$, where $dA =$ ____ d ____ d ____

Note: Use t for θ in your expressions.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.3: Problem 9

Previous | Problem List | Next

(1 point) **(a)** Graph $r = 1/(6\cos\theta)$ for $-\pi/2 < \theta < \pi/2$ and $r = 1$. Then write an iterated integral in polar coordinates representing the area inside the curve $r = 1$ and to the right of $r = 1/(6\cos\theta)$. (Use t for θ in your work.)

With $a =$ ____ , $b =$ ____ ,

$c =$ ____ , and $d =$ ____ ,

area = $\int_a^b \int_c^d$ ____ d ____ d ____

(b) Evaluate your integral to find the area.

area = ____

Note: *You must complete part (a) in order to receive any partial credit.*

Note: *You can earn partial credit on this problem.*

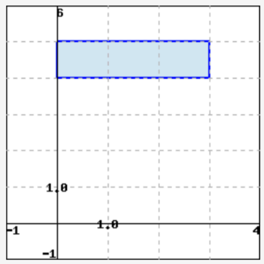
Preview My Answers | Submit Answers

Section 12.3: Problem 10

Previous | Problem List | Next

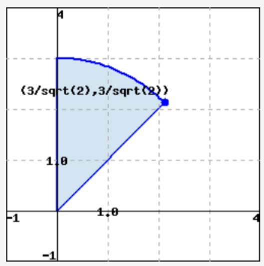
(1 point) For each of the following, set up the integral of an arbitrary function $f(x, y)$ over the region in whichever of rectangular or polar coordinates is most appropriate. (Use t for θ in your expressions.)

(a) The region



With $a =$ ___, $b =$ ___,
$c =$ ___, and $d =$ ___,
integral = $\int_a^b \int_c^d$ ___ d ___ d ___

(b) The region



With $a =$ ___, $b =$ ___,
$c =$ ___, and $d =$ ___,
integral = $\int_a^b \int_c^d$ ___ d ___ d ___

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.3: Problem 11

Previous | Problem List | Next

(1 point) Find the volume of the region between the graph of $f(x, y) = 16 - x^2 - y^2$ and the xyplane.

volume = ___

Preview My Answers | Submit Answers

Section 12.3: Problem 12

Previous | Problem List | Next

(1 point) Consider the solid shaped like an ice cream cone that is bounded by the functions $z = \sqrt{x^2+y^2}$ and $z = \sqrt{50-x^2-y^2}$. Set up an integral in polar coordinates to find the volume of this ice cream cone.

Instructions: Please enter the integrand in the first answer box, typing *theta* for θ. Depending on the order of integration you choose, enter *dr* and *dtheta* in either order into the second and third answer boxes with only one *dr* or *dtheta* in each box. Then, enter the limits of integration and evaluate the integral to find the volume.

$$\int_A^B \int_C^D \_\_\_\_ \;\_\_\_\_\;\_\_\_\_$$

A = ____

B = ____

C = ____

D = ____

Volume = ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.3: Problem 13

Previous | Problem List | Next

(1 point)
Match each double integral in polar with the graph of the region of integration.

? 1. $\int_0^{2\pi} \int_2^3 f(r,\theta)\, r\, dr\, d\theta$

? 2. $\int_0^{2} \int_{-\pi/2}^{3\pi/4} f(r,\theta)\, r\, d\theta\, dr$

? 3. $\int_{3\pi/4}^{3\pi/2} \int_0^2 f(r,\theta)\, r\, dr\, d\theta$

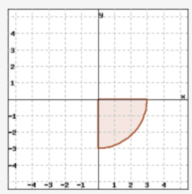
? 4. $\int_2^{3} \int_{3\pi/4}^{7\pi/4} f(r,\theta)\, r\, d\theta\, dr$

? 5. $\int_{3\pi/2}^{2\pi} \int_0^3 f(r,\theta)\, r\, dr\, d\theta$

? 6. $\int_{-\pi/4}^{3\pi/4} \int_2^3 f(r,\theta)\, r\, dr\, d\theta$

? 7. $\int_0^{2} \int_0^{3\pi/4} f(r,\theta)\, r\, d\theta\, dr$

? 8. $\int_0^{2\pi} \int_0^2 f(r,\theta)\, r\, dr\, d\theta$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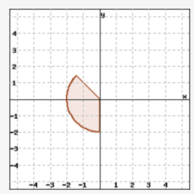
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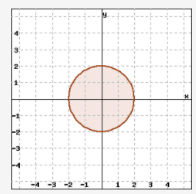
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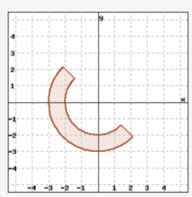
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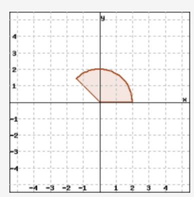
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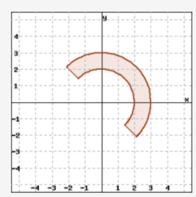
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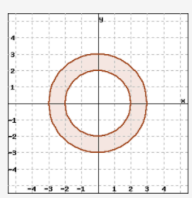
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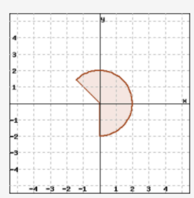

H

Note: *You can earn 10% partial credit for 2 - 4 correct answers, 60% partial credit for 5 - 6 correct answers, and 80% partial credit for 7 correct answers.*

Preview My Answers | Submit Answers

Section 12.3: Problem 14

Previous | Problem List | Next

(1 point) Convert the integral below to polar coordinates and evaluate the integral.

$$\int_0^{4/\sqrt{2}} \int_y^{\sqrt{16-y^2}} xy\,dx\,dy$$

Instructions: Please enter the integrand in the first answer box, typing *theta* for θ. Depending on the order of integration you choose, enter *dr* and *dtheta* in either order into the second and third answer boxes with only one *dr* or *dtheta* in each box. Then, enter the limits of integration and evaluate the integral to find the volume.

$$\int_A^B \int_C^D$$

A =

B =

C =

D =

Volume =

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.3: Problem 15

Previous | Problem List | Next

(1 point)
Find the volume of the wedge-shaped region (Figure 1) contained in the cylinder $x^2 + y^2 = 4$ and bounded above by the plane $z = x$ and below by the xy-plane.

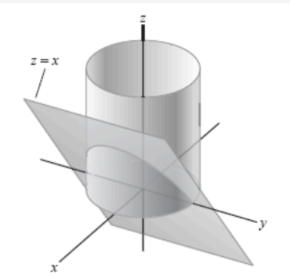


FIGURE 1

$V =$

Preview My Answers | Submit Answers

Section 12.4: Problem 1

Previous | Problem List | Next

(1 point)

Electric charge is distributed over the disk
$x^2 + y^2 \leq 19$ so that the charge density at (x,y) is $\sigma(x, y) = 12 + x^2 + y^2$ coulombs per square meter.
Find the total charge on the disk.

Preview My Answers | Submit Answers

Section 12.4: Problem 2

Previous | Problem List | Next

(1 point) Find the mass of the rectangular region $0 \leq x \leq 2, 0 \leq y \leq 3$ with density function $\rho\,(x, y) = 3 - y$.

Preview My Answers | Submit Answers

Section 12.4: Problem 3

Previous | Problem List | Next

(1 point) Find the mass of the triangular region with vertices (0, 0), (3, 0), and (0, 2), with density function $\rho\,(x, y) = x^2 + y^2$.

Preview My Answers | Submit Answers

Section 12.4: Problem 4

Previous | Problem List | Next

(1 point)

A lamina occupies the part of the rectangle $0 \leq x \leq 8, 0 \leq y \leq 1$ and the density at each point is given by the function $\rho(x, y) = 8x + 3y + 1$.

A. What is the total mass?

B. Where is the center of mass? (,)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.4: Problem 5

Previous | Problem List | Next

(1 point)

A lamina occupies the region inside the circle $x^2 + y^2 = 10y$ but outside the circle $x^2 + y^2 = 25$. The density at each point is inversely proportional to its distance from the orgin.

Where is the center of mass?

(,)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.4: Problem 6

Previous | Problem List | Next

(1 point)

A lamina occupies the part of the disk $x^2 + y^2 \leq 25$ in the first quadrant and the density at each point is given by the function $\rho(x, y) = 2(x^2 + y^2)$.

A. What is the total mass?

D. Where is the center of mass? (,)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.4: Problem 7

Previous | Problem List | Next

(1 point)

A lamina occupies the part of the disk $x^2 + y^2 \leq 16$ in the first quadrant and the density at each point is given by the function $\rho(x, y) = 4(x^2 + y^2)$.

A. What is the total mass?

B. What is the moment about the x-axis?

C. What is the moment about the y-axis?

D. Where is the center of mass? (,)

E. What is the moment of inertia about the origin?

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.4: Problem 8

Previous | Problem List | Next

(1 point)

You are getting married and your dearest relative has baked you a cake which fills the volume between the two planes, $z = 0$ and $z = 6x + 1y + c$, and inside the cylinder $x^2 + y^2 = 1$. You are to cut it in half by making two vertical slices from the center outward. Suppose one of the slices is at $\theta = 0$ and the other is at $\theta = \psi$.

What is the limit, $\lim_{c \to \infty} \psi$?

Preview My Answers | Submit Answers

Section 12.4: Problem 9

Previous | Problem List | Next

(1 point)

A lamp has two bulbs, each of a type with an average lifetime of 12 hours. The probability density function for the lifetime of a bulb is $f(t) = \frac{1}{12}e^{-t/12}, t \leq 0$. What is the probability that both of the bulbs will fail within 4 hours?

Preview My Answers | Submit Answers

Section 12.5: Problem 1

Previous | Problem List | Next

(1 point) Evaluate $\iiint_B ze^{x+y}dV$ where B is the box determined by $0 \le x \le 3$, $0 \le y \le 1$, and $0 \le z \le 2$.

The value is ______ .

Preview My Answers | Submit Answers

Section 12.5: Problem 2

Previous | Problem List | Next

(1 point) Evaluate the triple integral $\iiint_E xy\,dV$ where E is the solid tetrahedon with vertices $(0,0,0)$, $(6,0,0)$, $(0,9,0)$, $(0,0,4)$.

______

Preview My Answers | Submit Answers

Section 12.5: Problem 3

Previous | Problem List | Next

(1 point) Evaluate the triple integral $\iiint_E x^6 e^y\,dV$ where E is bounded by the parabolic cylinder $z = 49 - y^2$ and the planes $z = 0$, $x = 7$, and $x = -7$.

______

Preview My Answers | Submit Answers

Section 12.5: Problem 4

Previous | Problem List | Next

(1 point) Evaluate the triple integral $\iiint_E x\,dV$ where E is the solid bounded by the paraboloid $x = 6y^2 + 6z^2$ and $x = 6$.

______

Preview My Answers | Submit Answers

Section 12.5: Problem 5

Previous | Problem List | Next

(1 point) Evaluate the triple integral $\iiint_E z\,dV$ where E is the solid bounded by the cylinder $y^2 + z^2 = 9$ and the planes $x = 0, y = 3x$ and $z = 0$ in the first octant.

Preview My Answers | Submit Answers

Section 12.5: Problem 6

Previous | Problem List | Next

(1 point) Use a triple integral to find the volume of the solid bounded by the parabolic cylinder $y = 9x^2$ and the planes $z = 0, z = 9$ and $y = 11$.

Preview My Answers | Submit Answers

Section 12.5: Problem 7

Previous | Problem List | Next

(1 point) Find the volume of the solid enclosed by the paraboloids $z = 4\left(x^2 + y^2\right)$ and $z = 8 - 4\left(x^2 + y^2\right)$.

Preview My Answers | Submit Answers

Section 12.5: Problem 8

Previous | Problem List | Next

(1 point)

Express the integral $\iiint_E f(x,y,z)dV$ as an iterated integral in six different ways, where E is the solid bounded by $z=0, x=0, z=y-6x$ and $y=18$.

1. $\int_a^b \int_{g_1(x)}^{g_2(x)} \int_{h_1(x,y)}^{h_2(x,y)} f(x,y,z)dzdydx$

$a =$ ____ $b =$ ____
$g_1(x) =$ ____ $g_2(x) =$ ____
$h_1(x,y) =$ ____ $h_2(x,y) =$ ____

2. $\int_a^b \int_{g_1(y)}^{g_2(y)} \int_{h_1(x,y)}^{h_2(x,y)} f(x,y,z)dzdxdy$

$a =$ ____ $b =$ ____
$g_1(y) =$ ____ $g_2(y) =$ ____
$h_1(x,y) =$ ____ $h_2(x,y) =$ ____

3. $\int_a^b \int_{g_1(z)}^{g_2(z)} \int_{h_1(y,z)}^{h_2(y,z)} f(x,y,z)dxdydz$

$a =$ ____ $b =$ ____
$g_1(z) =$ ____ $g_2(z) =$ ____
$h_1(y,z) =$ ____ $h_2(y,z) =$ ____

4. $\int_a^b \int_{g_1(y)}^{g_2(y)} \int_{h_1(y,z)}^{h_2(y,z)} f(x,y,z)dxdzdy$

$a =$ ____ $b =$ ____
$g_1(y) =$ ____ $g_2(y) =$ ____
$h_1(y,z) =$ ____ $h_2(y,z) =$ ____

5. $\int_a^b \int_{g_1(x)}^{g_2(x)} \int_{h_1(x,z)}^{h_2(x,z)} f(x,y,z)dydzdx$

$a =$ ____ $b =$ ____
$g_1(x) =$ ____ $g_2(x) =$ ____
$h_1(x,z) =$ ____ $h_2(x,z) =$ ____

6. $\int_a^b \int_{g_1(z)}^{g_2(z)} \int_{h_1(x,z)}^{h_2(x,z)} f(x,y,z)dydxdz$

$a =$ ____ $b =$ ____
$g_1(z) =$ ____ $g_2(z) =$ ____
$h_1(x,z) =$ ____ $h_2(x,z) =$ ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.5: Problem 9

Previous | Problem List | Next

(1 point) Express the integral $\iiint_E f(x,y,z)dV$ as an iterated integral in six different ways, where E is the solid bounded by $z = 0, z = 8y$ and $x^2 = 25 - y$.

1. $\int_a^b \int_{g_1(x)}^{g_2(x)} \int_{h_1(x,y)}^{h_2(x,y)} f(x,y,z)dzdydx$

$a =$ ____ $b =$ ____
$g_1(x) =$ ____ $g_2(x) =$ ____
$h_1(x,y) =$ ____ $h_2(x,y) =$ ____

2. $\int_a^b \int_{g_1(y)}^{g_2(y)} \int_{h_1(x,y)}^{h_2(x,y)} f(x,y,z)dzdxdy$

$a =$ ____ $b =$ ____
$g_1(y) =$ ____ $g_2(y) =$ ____
$h_1(x,y) =$ ____ $h_2(x,y) =$ ____

3. $\int_a^b \int_{g_1(z)}^{g_2(z)} \int_{h_1(y,z)}^{h_2(y,z)} f(x,y,z)dxdydz$

$a =$ ____ $b =$ ____
$g_1(z) =$ ____ $g_2(z) =$ ____
$h_1(y,z) =$ ____ $h_2(y,z) =$ ____

4. $\int_a^b \int_{g_1(y)}^{g_2(y)} \int_{h_1(y,z)}^{h_2(y,z)} f(x,y,z)dxdzdy$

$a =$ ____ $b =$ ____
$g_1(y) =$ ____ $g_2(y) =$ ____
$h_1(y,z) =$ ____ $h_2(y,z) =$ ____

5. $\int_a^b \int_{g_1(x)}^{g_2(x)} \int_{h_1(x,z)}^{h_2(x,z)} f(x,y,z)dydzdx$

$a =$ ____ $b =$ ____
$g_1(x) =$ ____ $g_2(x) =$ ____
$h_1(x,z) =$ ____ $h_2(x,z) =$ ____

6. $\int_a^b \int_{g_1(z)}^{g_2(z)} \int_{h_1(x,z)}^{h_2(x,z)} f(x,y,z)dydxdz$

$a =$ ____ $b =$ ____
$g_1(z) =$ ____ $g_2(z) =$ ____
$h_1(x,z) =$ ____ $h_2(x,z) =$ ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.6: Problem 1

Previous | Problem List | Next

(1 point) What are the rectangular coordinates of the point whose cylindrical coordinates are $(r = 3,\ \theta = \frac{5}{9}\pi,\ z = -8)$?

$x =$

$y =$

$z =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.6: Problem 2

Previous | Problem List | Next

(1 point) What are the rectangular coordinates of the point whose cylindrical coordinates are $(r = 7,\ \theta = 0.6,\ z = 0)$?

$x =$

$y =$

$z =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.6: Problem 3

Previous | Problem List | Next

(1 point) What are the cylindrical coordinates of the point whose rectangular coordinates are $(x = 5,\ y = 5,\ z = 2)$?

r =

θ =

z =

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.6: Problem 4

Previous | Problem List | Next

(1 point) What are the cylindrical coordinates of the point whose rectangular coordinates are $(x = -5,\ y = 5,\ z = -5)$?

r =

θ =

z =

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.6: Problem 5

Previous | Problem List | Next

(1 point) Express the point given in Cartesian coordinates in cylindrical coordinates (r, θ, z).

A) $\left(9\left(\frac{\sqrt{2}}{2}\right),\ 9\left(\frac{\sqrt{2}}{2}\right),\ -4\right)$ = (, ,)

B) $\left(-9\left(\frac{\sqrt{2}}{2}\right), 9\left(\frac{\sqrt{2}}{2}\right), -4\right)$ = (, ,)

C) $\left(9\left(\frac{\sqrt{2}}{2}\right), -9\left(\frac{\sqrt{2}}{2}\right), -4\right)$ = (, ,)

D) $\left(-9\left(\frac{\sqrt{2}}{2}\right), -9\left(\frac{\sqrt{2}}{2}\right), -4\right)$ = (, ,)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.6: Problem 6

Previous | Problem List | Next

(1 point) Use cylindrical coordinates to evaluate the triple integral $\iiint_E \sqrt{x^2+y^2}\,dV$, where E is the solid bounded by the circular paraboloid $z = 9 - 16(x^2+y^2)$ and the xy-plane.

Preview My Answers | Submit Answers

Section 12.6: Problem 7

Previous | Problem List | Next

(1 point) Find the volume of the solid enclosed by the paraboloids $z = 25\left(x^2+y^2\right)$ and $z = 32 - 25\left(x^2+y^2\right)$.

Preview My Answers | Submit Answers

Section 12.6: Problem 8

Previous | Problem List | Next

(1 point) Find the volume of the ellipsoid $x^2 + y^2 + 9z^2 = 81$.

Preview My Answers | Submit Answers

Section 12.6: Problem 9

Previous | Problem List | Next

(1 point) Find an equation for the plane $y = 3x$ in cylindrical coordinates. (Type theta for θ in your answer.)

equation:

Preview My Answers | Submit Answers

Section 12.6: Problem 10

Previous | Problem List | Next

(1 point) Suppose $f(x, y, z) = x^2 + y^2 + z^2$ and W is the solid cylinder with height 5 and base radius 5 that is centered about the z-axis with its base at $z = -2$. Enter θ as *theta*.

(a) As an iterated integral,

$$\iiint_W f\, dV = \int_A^B \int_C^D \int_E^F \boxed{}\, dz\, dr\, d\theta$$

with limits of integration

A =

B =

C =

D =

E =

F =

(b) Evaluate the integral.

Preview My Answers | Submit Answers

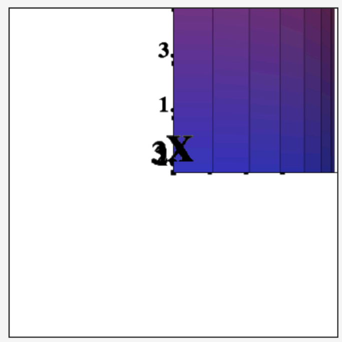
Section 12.6: Problem 11

Previous | Problem List | Next

(1 point)

Suppose the solid W in the figure is one-quarter of a circular cylinder of height 6 and radius 4 centered about the z-axis in the first octant. Find the limits of integration for an iterated integral of the form

$$\iiint_W f\, dV = \int_A^B \int_C^D \int_E^F f(r, \theta, z)\, dz\, r dr\, d\theta.$$



(Drag to rotate)

A =

B =

C =

D =

E =

F =

If necessary, enter θ as *theta*.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 1

Previous | Problem List | Next

(1 point) What are the rectangular coordinates of the point whose spherical coordinates are $\left(2, \frac{3\pi}{4}, \frac{5\pi}{6}\right)$?

$x =$

$y =$

$z =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 2

Previous | Problem List | Next

(1 point) What are the spherical coordinates of the point whose rectangular coordinates are
$(1,\ 5,\ -1)$?

$\rho =$

$\theta =$

$\phi =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 3

Previous | Problem List | Next

(1 point) Express the point given in Cartesian coordinates in spherical coordinates (ρ, θ, ϕ). Note: you really only have to do the work for one, if you use a little geometry and your knowledge of the trig functions.

A) $\left(\frac{3}{4}, \frac{3}{4}\sqrt{3}, -\frac{3}{2}\sqrt{3}\right) =$

B) $\left(-\frac{3}{4}, \frac{3}{4}\sqrt{3}, -\frac{3}{2}\sqrt{3}\right) =$

C) $\left(\frac{3}{4}, -\frac{3}{4}\sqrt{3}, +\frac{3}{2}\sqrt{3}\right) =$

D) $\left(-\frac{3}{4}, -\frac{3}{4}\sqrt{3}, +\frac{3}{2}\sqrt{3}\right) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.

Section 12.7: Problem 4

Previous | Problem List | Next

(1 point) What are the cylindrical coordinates of the point whose spherical coordinates are
$(\rho, \theta, \phi) = (2,\ 1,\ \frac{\pi}{6})$?

$r =$

$\theta =$

$z =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 5

Previous | Problem List | Next

(1 point)

Match the given equation with the verbal description of the surface:

A. Plane
B. Half plane
C. Cone
D. Sphere
E. Elliptic or Circular Paraboloid
F. Circular Cylinder

1. $\phi = \frac{\pi}{3}$
2. $\rho \cos(\phi) = 4$
3. $r = 4$
4. $r = 2\cos(\theta)$
5. $\rho = 4$
6. $r^2 + z^2 = 16$
7. $\theta = \frac{\pi}{3}$
8. $z = r^2$
9. $\rho = 2\cos(\phi)$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 6

Previous | Problem List | Next

(1 point) Match the integrals with the type of coordinates which make them the easiest to do. Put the letter of the coordinate system to the left of the number of the integral.

1. $\iiint_E z\,dV$ where E is: $1 \le x \le 2, 3 \le y \le 4, 5 \le z \le 6$
2. $\iiint_E dV$ where E is: $x^2 + y^2 + z^2 \le 4, x \ge 0, y \ge 0, z \ge 0$
3. $\iint_D \frac{1}{x^2+y^2}\,dA$ where D is: $x^2 + y^2 \le 4$
4. $\iiint_E z^2\,dV$ where E is: $-2 \le z \le 2, 1 \le x^2 + y^2 \le 2$
5. $\int_0^1 \int_0^{y^2} \frac{1}{x}\,dx\,dy$

A. polar coordinates
B. cylindrical coordinates
C. spherical coordinates
D. cartesian coordinates

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 7

Previous | Problem List | Next

(1 point) Use spherical coordinates to evaluate the triple integral $\iiint_E (x^2+y^2+z^2)\,dV$, where E is the ball: $x^2+y^2+z^2 \leq 64$.

Preview My Answers | Submit Answers

Section 12.7: Problem 8

Previous | Problem List | Next

(1 point) Use spherical coordinates to evaluate the triple integral $\iiint_E \frac{e^{-(x^2+y^2+z^2)}}{\sqrt{x^2+y^2+z^2}}\,dV$, where E is the region bounded by the spheres $x^2+y^2+z^2=16$ and $x^2+y^2+z^2=49$.

Preview My Answers | Submit Answers

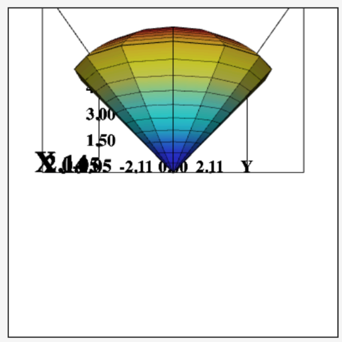
Section 12.7: Problem 9

Previous | Problem List | Next

(1 point)

Suppose the solid W in the figure is a cone centered about the positive z-axis with its vertex at the origin, a 90° angle at its vertex, and topped by a sphere radius 6. Find the limits of integration for an iterated integral of the form

$$\iiint_W dV = \int_A^B \int_C^D \int_E^F \rho^2 \sin(\phi)\, d\rho\, d\phi\, d\theta.$$



(Drag to rotate)

A =

B =

C =

D =

E =

F =

If necessary, enter ρ as *rho*, ϕ as *phi*, and θ as *theta*.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 10

(1 point)

Suppose the solid W in the figure consists of the points below the xy-plane that are between concentric spheres centered at the origin of radii 2 and 8. Find the limits of integration for an iterated integral of the form

$$\iiint_W f\,dV = \int_A^B \int_C^D \int_E^F f(\rho,\phi,\theta)\,\rho^2 \sin(\phi)\,d\rho\,d\phi\,d\theta.$$

A =

B =

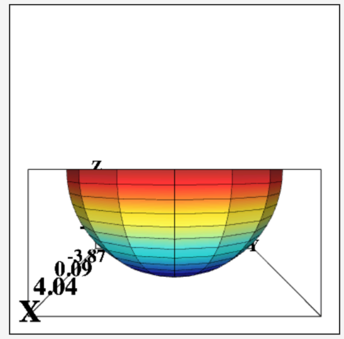
C =

D =

E =

F =

If necessary, enter ρ as *rho*, ϕ as *phi*, and θ as *theta*.



(Drag to rotate)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 11

(1 point) FInd the volume of the solid that lies within the sphere $x^2+y^2+z^2=49$, above the xy plane, and outside the cone $z=4\sqrt{x^2+y^2}$.

Preview My Answers | Submit Answers

Section 12.7: Problem 12

(1 point) Find an equation for the paraboloid $z=x^2+y^2$ in spherical coordinates. (Enter rho, phi and theta for ρ, ϕ and θ, respectively.)

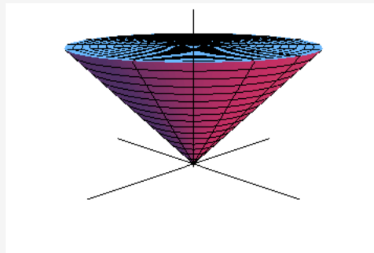
equation:

Preview My Answers | Submit Answers

Section 12.7: Problem 13

Previous | Problem List | Next

(1 point) The region W is the cone shown below.



The angle at the vertex is $\pi/3$, and the top is flat and at a height of $6\sqrt{3}$.

Write the limits of integration for $\int_W dV$ in the following coordinates (do **not** reduce the domain of integration by taking advantage of symmetry):

(a) Cartesian:

With $a =$ ____ , $b =$ ____ ,

$c =$ ____ , $d =$ ____ ,

$e =$ ____ , and $f =$ ____ ,

Volume = $\int_a^b \int_c^d \int_e^f$ ____ d ____ d ____ d ____

(b) Cylindrical:

With $a =$ ____ , $b =$ ____ ,

$c =$ ____ , $d =$ ____ ,

$e =$ ____ , and $f =$ ____ ,

Volume = $\int_a^b \int_c^d \int_e^f$ ____ d ____ d ____ d ____

(c) Spherical:

With $a =$ ____ , $b =$ ____ ,

$c =$ ____ , $d =$ ____ ,

$e =$ ____ , and $f =$ ____ ,

Volume = $\int_a^b \int_c^d \int_e^f$ ____ d ____ d ____ d ____

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 12.7: Problem 14

Previous | Problem List | Next

(1 point) Evaluate the integral.

$$\int_0^5 \int_{-\sqrt{25-x^2}}^{\sqrt{25-x^2}} \int_{-\sqrt{25-x^2-z^2}}^{\sqrt{25-x^2-z^2}} \frac{1}{(x^2+y^2+z^2)^{1/2}}\, dy\, dz\, dx =$$ ____

Preview My Answers | Submit Answers

Section 13.1: Problem 1

Previous | Problem List | Next

(1 point) Compute the gradient vector fields of the following functions:

A. $f(x, y) = 2x^2 + 6y^2$

$\nabla f(x, y) =$ ____ $\mathbf{i} +$ ____ $\mathbf{j}$

B. $f(x, y) = x^4 y^9$,

$\nabla f(x, y) =$ ____ $\mathbf{i} +$ ____ $\mathbf{j}$

C. $f(x, y) = 2x + 6y$

$\nabla f(x, y) =$ ____ $\mathbf{i} +$ ____ $\mathbf{j}$

D. $f(x, y, z) = 2x + 6y + 4z$

$\nabla f(x, y) =$ ____ $\mathbf{i} +$ ____ $\mathbf{j} +$ ____ $\mathbf{k}$

E. $f(x, y, z) = 2x^2 + 6y^2 + 4z^2$

$\nabla f(x, y, z) =$ ____ $\mathbf{i} +$ ____ $\mathbf{j} +$ ____ $\mathbf{k}$

Note: *You can earn partial credit on this problem.*

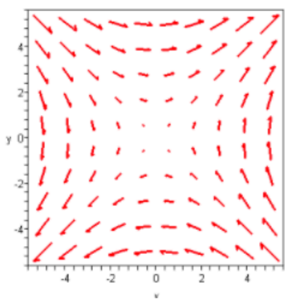
Preview My Answers | Submit Answers

Section 13.1: Problem 2

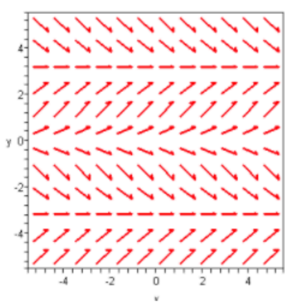
Previous | Problem List | Next

(1 point)
Match the plots labeled A - D with the vector fields $\mathbf{F}$ below.

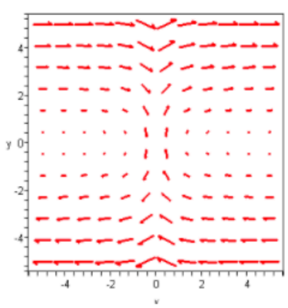
A.



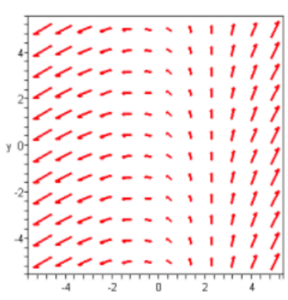
B.



C.



D.



1. $\mathbf{F} = \langle y, x \rangle$
2. $\mathbf{F} = \langle y, 1/x \rangle$
3. $\mathbf{F} = \langle 1, \sin y \rangle$
4. $\mathbf{F} = \langle x - 2, x + 1 \rangle$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

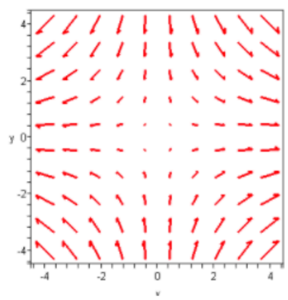
You have attempted this problem 0 times.
You have 4 attempts remaining.

Section 13.1: Problem 3

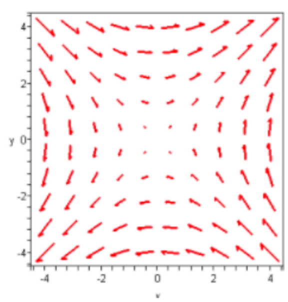
Previous Problem List Next

(1 point)
Match the functions f with the plots of their gradient vector fields labeled A-D.

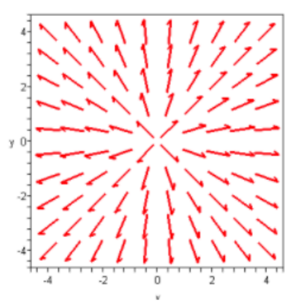
A.



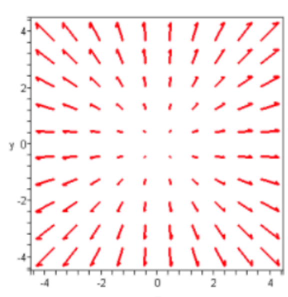
B.



C.



D.



1. $f(x,y) = xy$
2. $f(x,y) = x^2 - y^2$
3. $f(x,y) = \sqrt{x^2 + y^2}$
4. $f(x,y) = x^2 + y^2$

Note: *You can earn partial credit on this problem.*

Preview My Answers Submit Answers

You have attempted this problem 0 times.
You have 4 attempts remaining.

Section 13.1: Problem 4

Previous | Problem List | Next

(1 point) Write a formula for a two-dimensional vector field which has all vectors parallel to the x-axis and all vectors on a horizontal line having the same magnitude.

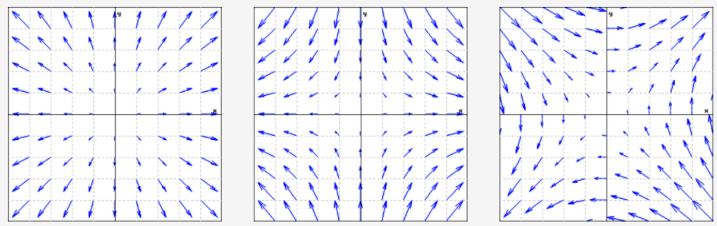
$\vec{V} =$

Preview My Answers | Submit Answers

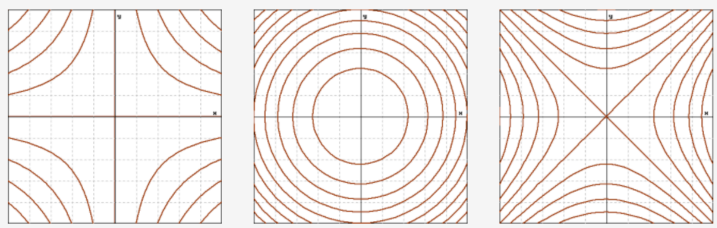
Section 13.1: Problem 5

Previous | Problem List | Next

(1 point) Each vector field shown is the gradient of a function $f(x, y)$.Match the gradient field of each function to the contour plot of that function.



1. Choose   2. Choose   3. Choose



A   B   C

(Click on a graph to enlarge it.)

Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 4 attempts remaining.

Section 13.1: Problem 6

Previous | Problem List | Next

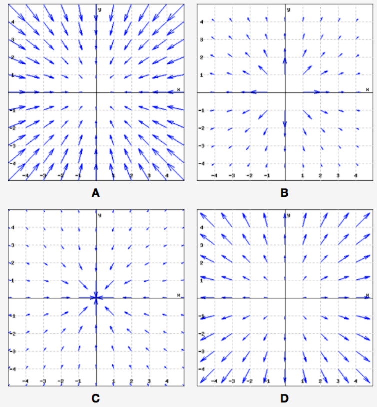
(1 point)
Each vector field shown shown represents the force on a particle at different points in the plane as a result of another particle at the origin. Match each vector field with its description.

? **1.** An attractive force whose magnitude increases as distance increases.

? **2.** A repulsive force whose magnitude increases as distance increases.

? **3.** An attractive force whose magnitude decreases as distance increases.

? **4.** A repulsive force whose magnitude decreases as distance increases.



(Click on a graph to enlarge it.)

Note: *You can earn 50% partial credit for 2 - 3 correct answers.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 4 attempts remaining.

Section 13.1: Problem 7

Previous | Problem List | Next

(1 point) Match each vector field with its graph.

? **1.** $\vec{F} = x\vec{i} + y\vec{j} + z\vec{k}$

? **2.** $\vec{F} = \dfrac{x\vec{i} + y\vec{j} + z\vec{k}}{(x^2 + y^2 + z^2)^{3/2}}$

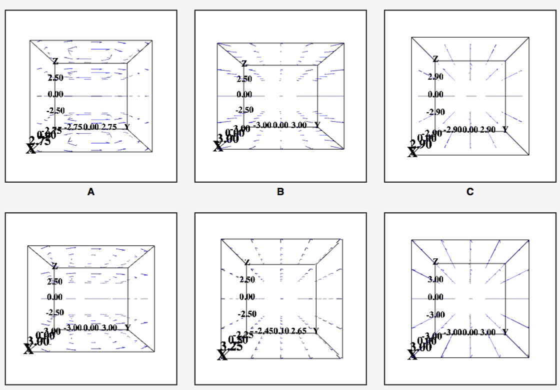
? **3.** $\vec{F} = -y\vec{i} + x\vec{j}$

? **4.** $\vec{F} = \vec{i}$

? **5.** $\vec{F} = \dfrac{-y\vec{i} + x\vec{j}}{x^2 + y^2}$

? **6.** $\vec{F} = x\vec{i} + y\vec{j}$

.



(You can drag the images to rotate them.)

Note: *You can earn 50% partial credit for 3 - 5 correct answers.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 6 attempts remaining.

Section 13.2: Problem 1

Previous | Problem List | Next

(1 point) Evaluate the line integral $\int_C x^2 z \, ds$ where C is the line segment from $(0, 1, 6)$ to $(3, 2, 8)$

Preview My Answers | Submit Answers

Section 13.2: Problem 2

Previous | Problem List | Next

(1 point) Evaluate the line integral $\int_C 5xy^4 \, ds$, where C is the right half of the circle $x^2 + y^2 = 36$.

Preview My Answers | Submit Answers

Section 13.2: Problem 3

Previous | Problem List | Next

(1 point) Compute the total mass of a wire bent in a quarter circle with parametric equations: $x = 6\cos t,\ y = 6\sin t,\ 0 \le t \le \frac{\pi}{2}$ and density function $\rho(x, y) = x^2 + y^2$.

Preview My Answers | Submit Answers

Section 13.2: Problem 4

Previous | Problem List | Next

(1 point) Let C be the curve which is the union of two line segments, the first going from $(0, 0)$ to $(-1, 4)$ and the second going from $(-1, 4)$ to $(-2, 0)$.
Compute the line integral $\int_C -1dy - 4dx$.

Preview My Answers | Submit Answers

Section 13.2: Problem 5

Previous | Problem List | Next

(1 point) Let $\mathbf{F}$ be the radial force field $\mathbf{F} = x\mathbf{i} + y\mathbf{j}$. Find the work done by this force along the following two curves, both of which go from $(0, 0)$ to $(6, 36)$. (Compare your answers!)

A. If C_1 is the parabola: $x = t,\ y = t^2,\ 0 \le t \le 6$, then

$\int_{C_1} \mathbf{F} \cdot d\mathbf{r} =$

B. If C_2 is the straight line segment: $x = 6t^2,\ y = 36t^2,\ 0 \le t \le 1$, then

$\int_{C_2} \mathbf{F} \cdot d\mathbf{r} =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.2: Problem 6

Previous | Problem List | Next

(1 point) Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{F}(x, y, z) = -3x\,\mathbf{i} + 5y\,\mathbf{j} + z\,\mathbf{k}$ and C is given by the vector function $\mathbf{r}(t) = \langle \sin t, \cos t, t \rangle$, $\quad 0 \le t \le 3\pi/2$.

Preview My Answers | Submit Answers

Section 13.2: Problem 7

Previous | Problem List | Next

(1 point) Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{F}(x, y, z) = -2\sin(x)\,\mathbf{i} - 2\cos(y)\,\mathbf{j} - 2xz\,\mathbf{k}$ and C is given by the vector function $\mathbf{r}(t) = t^5\,\mathbf{i} - t^4\,\mathbf{j} + t^3\,\mathbf{k}$, $\quad 0 \le t \le 1$.

Preview My Answers | Submit Answers

Section 13.2: Problem 8

Previous | Problem List | Next

(1 point) Find the work done by the force field $\mathbf{F}(x, y, z) = 7x\,\mathbf{i} + 7y\,\mathbf{j} + 7\,\mathbf{k}$ on a particle that moves along the helix $\mathbf{r}(t) = \cos(t)\,\mathbf{i} + \sin(t)\,\mathbf{j} + 2t\,\mathbf{k}, 0 \le t \le 2\pi$.

Work =

Preview My Answers | Submit Answers

Section 13.2: Problem 9

Previous | Problem List | Next

(1 point) Let C be the counter-clockwise planar circle with center at the origin and radius $r > 0$. Without computing them, determine for the following vector fields $\mathbf{F}$ whether the line integrals $\int_C \mathbf{F} \cdot d\mathbf{r}$ are positive, negative, or zero and type P, N, or Z as appropriate.

A. $\mathbf{F}$ = the radial vector field = $x\mathbf{i} + y\mathbf{j}$:

B. $\mathbf{F}$ = the circulating vector field = $-y\mathbf{i} + x\mathbf{j}$:

C. $\mathbf{F}$ = the circulating vector field = $y\mathbf{i} - x\mathbf{j}$:

D. $\mathbf{F}$ = the constant vector field = $\mathbf{i} + \mathbf{j}$:

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.2: Problem 10

Previous | Problem List | Next

(1 point) A curve C is given by a vector function $\mathbf{r}(t), 2 \leq t \leq 8$, with unit tangent $\mathbf{T}(t)$, unit normal $\mathbf{N}(t)$, and unit binormal $\mathbf{B}(t)$. Indicate whether the following line integrals are positive, negative, or zero by typing P, N, or Z as appropriate:

A. $\int_C \mathbf{T} \cdot d\mathbf{r} =$

B. $\int_C \mathbf{N} \cdot d\mathbf{r} =$

C. $\int_C \mathbf{B} \cdot d\mathbf{r} =$

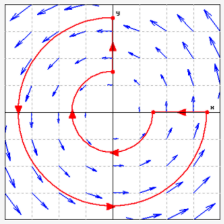
Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.2: Problem 11

Previous | Problem List | Next

(1 point) Determine whether the line integral of each vector field (in blue) along the oriented path (in red) is positive, negative, or zero.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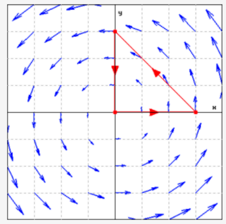
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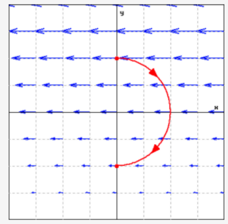
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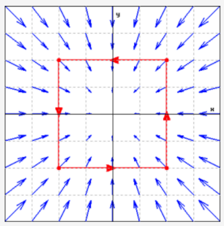
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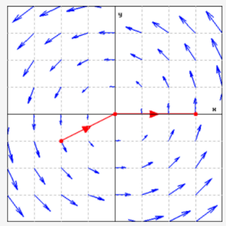
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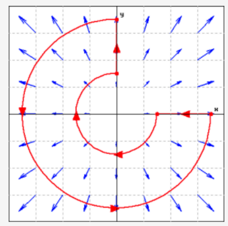
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(Click on a graph to enlarge it)

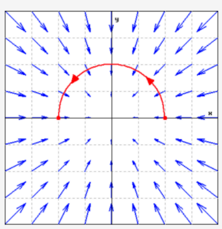
Note: *You can earn 50% partial credit for 3 - 5 correct answers.*

Preview My Answers | Submit Answers

Section 13.2: Problem 12

Previous | Problem List | Next

(1 point) Determine whether the line integral of each vector field (in blue) along the semicircular, oriented path (in red) is positive, negative, or zero.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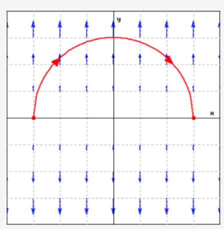
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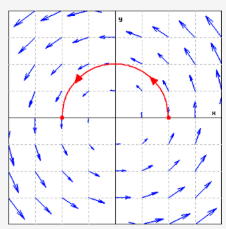
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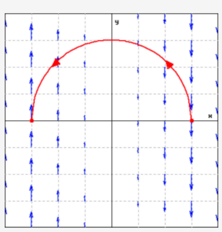
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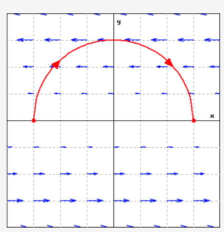
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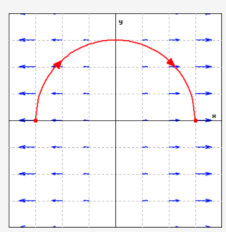
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(Click on a graph to enlarge it)

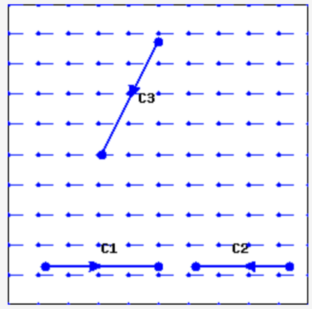
Note: *You can earn 50% partial credit for 3 - 5 correct answers.*

Preview My Answers | Submit Answers

Section 13.2: Problem 13

Previous | Problem List | Next

(1 point) Consider the vector field $\vec{F}$ shown in the figure below together with the paths C_1, C_2, and C_3.



(***Note:*** *For the vector field, vectors are shown with a dot at the* ***tail*** *of the vector.)*

Arrange the line integrals $\int_{C_1} \vec{F} \cdot d\vec{r}$, $\int_{C_2} \vec{F} \cdot d\vec{r}$ and $\int_{C_3} \vec{F} \cdot d\vec{r}$ in ascending order:

? < ? < ? .

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.2: Problem 14

Previous | Problem List | Next

(1 point) Suppose $\vec{F}(x, y) = -xy\vec{i} + y^2\vec{j}$.

(a) Find a vector parametric equation for the parabola $y = x^2$ from the origin to the point $(2, 4)$ using t as a parameter.

$\vec{r}(t) =$

(b) Find the line integral of $\vec{F}$ along the parabola $y = x^2$ from the origin to $(2, 4)$.

Preview My Answers | Submit Answers

Section 13.3: Problem 1

Previous | Problem List | Next

(1 point) For each of the following vector fields **F** , decide whether it is conservative or not by computing the appropriate first order partial derivatives. Type in a potential function f (that is, $\nabla f = \mathbf{F}$) with $f(0,0) = 0$. If it is not conservative, type N.

A. $\mathbf{F}(x,y) = (4x - 5y)\mathbf{i} + (-5x + 16y)\mathbf{j}$

$f(x,y) =$

B. $\mathbf{F}(x,y) = 2y\mathbf{i} + 3x\mathbf{j}$

$f(x,y) =$

C. $\mathbf{F}(x,y) = (2\sin y)\mathbf{i} + (-10y + 2x\cos y)\mathbf{j}$

$f(x,y) =$

Note: Your answers should be either expressions of x and y (e.g. "3xy + 2y"), or the letter "N"

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 2

Previous | Problem List | Next

(1 point) Consider the vector field $\mathbf{F}(x,y,z) = (5z + 3y)\mathbf{i} + (4z + 3x)\mathbf{j} + (4y + 5x)\mathbf{k}$.

a) Find a function f such that $\mathbf{F} = \nabla f$ and $f(0,0,0) = 0$.

$f(x,y,z) =$

b) Suppose C is any curve from $(0,0,0)$ to $(1,1,1)$. Use part a) to compute the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 3

Previous | Problem List | Next

(1 point) Consider the vector field $\mathbf{F}(x,y,z) = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$.

a) Find a function f such that $\mathbf{F} = \nabla f$ and $f(0,0,0) = 0$.

$f(x,y,z) =$

b) Use part a) to compute the work done by $\mathbf{F}$ on a particle moving along the curve C given by $\mathbf{r}(t) = (1 + 2\sin t)\mathbf{i} + (1 + \sin^2 t)\mathbf{j} + (1 + 4\sin^3 t)\mathbf{k}, \quad 0 \le t \le \frac{\pi}{2}$.

Work =

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 4

Previous | Problem List | Next

(1 point) Consider the vector field $\mathbf{F} = \langle x^2 + y^2, 3xy \rangle$.
Compute the line integrals $\int_{\mathbf{c}_1} \mathbf{F} \cdot d\mathbf{r}$ and $\int_{\mathbf{c}_2} \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{c}_1(t) = \langle t, t^2 \rangle$ and $\mathbf{c}_2(t) = \langle t, t \rangle$ for $0 \leq t \leq 1$.
Can you decide from your answers whether or not $\mathbf{F}$ is a gradient vector field? Why or why not?

$\int_{\mathbf{c}_1} \mathbf{F} \cdot d\mathbf{r} =$

$\int_{\mathbf{c}_2} \mathbf{F} \cdot d\mathbf{r} =$

Is $\mathbf{F}$ conservative? (yes/no)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 5

Previous | Problem List | Next

(1 point) Let $\mathbf{F} = \langle 2xy, 4y^2 \rangle$ be a vector field in the plane, and C the path $y = 9x^2$ joining $(0,0)$ to $(1,9)$ in the plane.

A. Evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$

B. Does the integral in part (A) depend on the path joining $(0,0)$ to $(1,9)$? (y/n)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 6

Previous | Problem List | Next

(1 point) Suppose $\mathbf{F} = \mathbf{F}(x, y, z)$ is a gradient field with $\mathbf{F} = \nabla f$, S is a level surface of f, and C is a curve on S. What is the value of the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$?

Preview My Answers | Submit Answers

Section 13.3: Problem 7

Previous | Problem List | Next

(1 point) Determine whether the given set is open, connected, and simply connected. For example, if it is open, connected, but not simply connected, type "YYN" standing for "Yes, Yes, No."

A. $\{(x, y) | x > 1, y < 2\}$

B. $\{(x, y) | 2x^2 + y^2 < 1\}$

C. $\{(x, y) | x^2 - y^2 < 1\}$

D. $\{(x, y) | x^2 - y^2 > 1\}$

E. $\{(x, y) | 1 < x^2 + y^2 < 4\}$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 8

Previous | Problem List | Next

(1 point) The domain of $f(x, y)$ is the xy-plane, and values of f are given in the table below.

$y \backslash x$	0	1	2	3	4
0	50	51	51	52	53
1	51	51	51	51	52
2	48	46	44	43	42
3	50	51	51	52	51
4	46	46	47	46	45

Find $\int_C \operatorname{grad} f \cdot d\vec{r}$, where C is

(a) A line from $(0, 1)$ to $(3, 3)$.

$\int_C \operatorname{grad} f \cdot d\vec{r} =$

(b) A circle of radius 1 centered at $(3, 2)$ traversed counterclockwise.

$\int_C \operatorname{grad} f \cdot d\vec{r} =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 9

Previous | Problem List | Next

(1 point)
The figure shows level curves of a function $f(x, y)$.

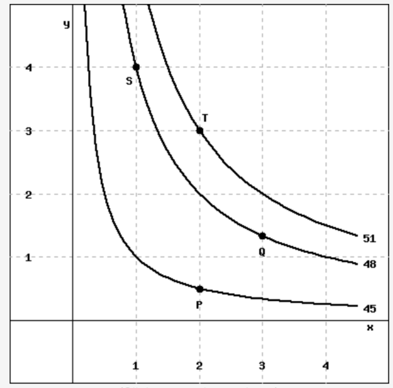
(a) Draw gradient vectors at P and Q. Is $\nabla f(P)$ longer than, shorter than, or the same length as $\nabla f(Q)$?
?

(b) If C is the line segment from P to Q, then
$\int_C \nabla f \cdot d\vec{r} =$

(c) If C is any piecewise-smooth path from P to T to Q, then
$\int_C \nabla f \cdot d\vec{r} =$

(d) If C is any piecewise-smooth path from S to P, then
$\int_C \nabla f \cdot d\vec{r} =$

(e) If C is any piecewise-smooth closed path from P to Q to T to S to P, then
$\int_C \nabla f \cdot d\vec{r} =$



(Click on graph to enlarge)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.3: Problem 10

Previous | Problem List | Next

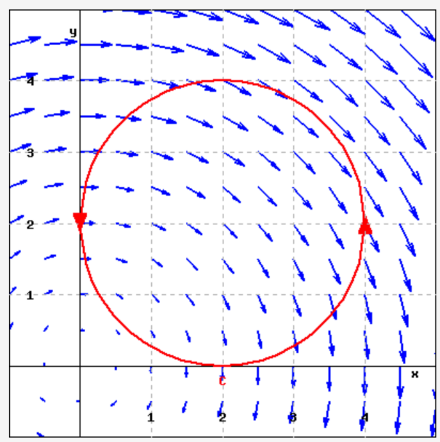
(1 point)
Consider the vector field $\vec{F}$ in the figure and the closed circular path C oriented counter-clockwise.

(a) Is $\int_C \vec{F} \cdot d\vec{r}$ positive, negative, or zero? ?

(b) True or False: $\vec{F} = \text{grad} f$ for some function f. Hint: use your answer to part (a). ?

(c) Which of the following formulas best fits $\vec{F}$?

- **A.** $\vec{F} = \frac{y}{(x^2+y^2)^2}\vec{i} - \frac{x}{(x^2+y^2)^2}\vec{j}$
- **B.** $\vec{F} = x\vec{i} + y\vec{j}$
- **C.** $\vec{F} = \frac{x}{(x^2+y^2)^2}\vec{i} + \frac{y}{(x^2+y^2)^2}\vec{j}$
- **D.** $\vec{F} = y\vec{i} - x\vec{j}$



(Click on graph to enlarge)

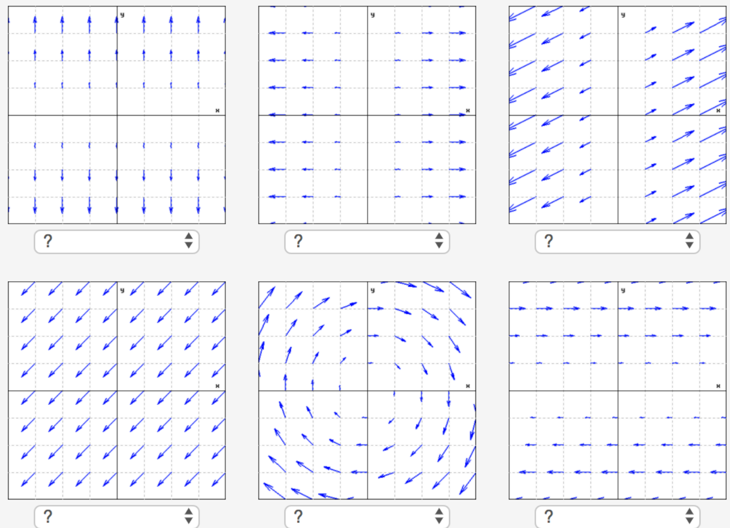
Note: *In order to get credit for this problem all answers must be correct.*

Preview My Answers | Submit Answers

Section 13.3: Problem 11

Previous | Problem List | Next

(1 point) Determine whether each of the following vector fields appears to be path independent (conservative) or path dependent (not conservative).



(Click on a graph to enlarge it)

Note: *You can earn 50% partial credit for 3 - 5 correct answers.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 4 attempts remaining.

Section 13.4: Problem 1

Previous | Problem List | Next

(1 point) Let C be the positively oriented circle $x^2 + y^2 = 1$. Use Green's Theorem to evaluate the line integral $\int_C 18y\,dx + 19x\,dy$.

Preview My Answers | Submit Answers

Section 13.4: Problem 2

Previous | Problem List | Next

(1 point) Let C be the positively oriented square with vertices $(0,0)$, $(3,0)$, $(3,3)$, $(0,3)$. Use Green's Theorem to evaluate the line integral $\int_C 2y^2 x\,dx + x^2 y\,dy$.

Preview My Answers | Submit Answers

Section 13.4: Problem 3

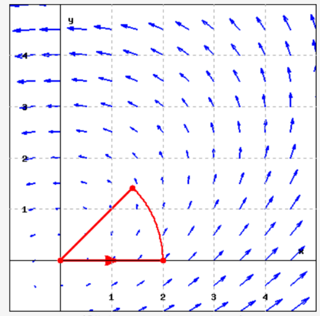
Previous | Problem List | Next

(1 point)
Suppose

$$\vec{F}(x,y) = (2x - 3y)\vec{i} + 2x\vec{j}$$

and C is the counter-clockwise oriented sector of a circle centered at the origin with radius 2 and central angle $\pi/4$. Use Green's theorem to calculate the circulation of $\vec{F}$ around C.

Circulation =



(Click on graph to enlarge)

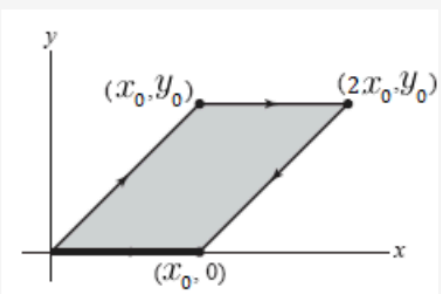
Preview My Answers | Submit Answers

Section 13.4: Problem 4

Previous | Problem List | Next

(1 point)
Use Green's Theorem to evaluate the line integral of $\mathbf{F} = \langle x^4, 7x \rangle$

around the boundary of the parallelogram in the following figure (note the orientation).



With $x_0 = 3$ and $y_0 = 3$.

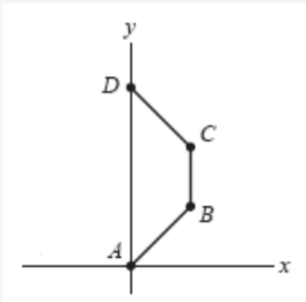
$\int_C x^4\,dx + 7x\,dy =$

Preview My Answers | Submit Answers

Section 13.4: Problem 5

Previous | Problem List | Next

(1 point)
Evaluate $I = \int_C (\sin x + 2y)\,dx + (2x + y)\,dy$ for the nonclosed path $ABCD$ in the figure.



$$A = (0,0), \quad B = (5,5), \quad C = (5,10), \quad D = (0,15)$$

$I =$

Preview My Answers | Submit Answers

Section 13.5: Problem 1

Previous | Problem List | Next

(1 point) Show that the vector field $F(x,y,z) = \langle 3y\cos(3x), 3x\sin(3y), 0\rangle$ is not a gradient vector field by computing its curl. How does this show what you intended?

$\mathrm{curl}(F) = \nabla \times F = \langle$, , $\rangle$.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.5: Problem 2

Previous | Problem List | Next

(1 point) A)
Consider the vector field $F(x,y,z) = \langle 4yz, -4xz, -8xy \rangle$.
Find the divergence and curl of F.

$\text{div}(F) = \nabla \cdot F =$ ______ .

$\text{curl}(F) = \nabla \times F = \langle$ ______ , ______ , ______ $\rangle$.

B)
Consider the vector field $F(x,y,z) = \langle 5x^2, (x+y)^2, 5(x+y+z)^2 \rangle$.
Find the divergence and curl of F.

$\text{div}(F) = \nabla \cdot F =$ ______ .

$\text{curl}(F) = \nabla \times F = \langle$ ______ , ______ , ______ $\rangle$.

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.5: Problem 3

Previous | Problem List | Next

(1 point) I.
Let $\mathbf{F} = 4x\mathbf{i} + 9y\mathbf{j} + 8z\mathbf{k}$. Compute the divergence and the curl.

A. div $\mathbf{F} =$ ______

B. curl $\mathbf{F} =$ ______ $\mathbf{i}+$ ______ $\mathbf{j}+$ ______ $\mathbf{k}$

II.
Let $\mathbf{F} = \langle 7xy, 9y, 4z \rangle$.
The curl of $\mathbf{F} = \langle$ ______ , ______ , ______ $\rangle$.
Is there a function f such that $\mathbf{F} = \nabla f$? ______ (yes/no)

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.5: Problem 4

Previous | Problem List | Next

(1 point) Consider the vector field $F(x,y,z) = \langle -5y, -5x, -8z \rangle$. Show that F is a gradient vector field $F = \nabla V$ by determining the function V which satisfies $V(0,0,0) = 0$.

$V(x,y,z) =$ ______

Preview My Answers | Submit Answers

Section 13.5: Problem 5

Previous | Problem List | Next

(1 point) Let $\mathbf{F} = \langle 4xyz + 7\sin x,\ 2x^2 z,\ 2x^2 y\rangle$.
Find a function f so that $\mathbf{F} = \nabla f$, and $f(0,0,0) = 0$.

Preview My Answers | Submit Answers

Section 13.5: Problem 6

Previous | Problem List | Next

(1 point) For each of the following vector fields $\mathbf{F}$, decide whether it is conservative or not by computing curl $\mathbf{F}$. Type in a potential function f (that is, $\nabla f = \mathbf{F}$). Assume the potential function has a value of zero at the origin. If the vector field is not conservative, type N.

A. $\mathbf{F}(x,y) = (10x - 6y)\mathbf{i} + (-6x + 4y)\mathbf{j}$
$f(x,y) =$

B. $\mathbf{F}(x,y) = 5y\mathbf{i} + 6x\mathbf{j}$
$f(x,y) =$

C. $\mathbf{F}(x,y,z) = 5x\mathbf{i} + 6y\mathbf{j} + \mathbf{k}$
$f(x,y,z) =$

D. $\mathbf{F}(x,y) = (5\sin y)\mathbf{i} + (-12y + 5x\cos y)\mathbf{j}$
$f(x,y) =$

E. $\mathbf{F}(x,y,z) = 5x^2\mathbf{i} - 6y^2\mathbf{j} + 2z^2\mathbf{k}$
$f(x,y,z) =$

Note: Your answers should be either expressions of x, y and z (e.g. "3xy + 2yz"), or the letter "N"

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.5: Problem 7

Previous | Problem List | Next

(1 point) Let $\mathbf{F}$ be any nonconstant vector field of the form $\mathbf{F} = f(x)\mathbf{i} + g(y)\mathbf{j} + h(z)\mathbf{k}$ and let $\mathbf{G}$ be any nonconservative vector field of the form $\mathbf{G} = f(y,z)\mathbf{i} + g(x,z)\mathbf{j} + h(x,y)\mathbf{k}$. Indicate whether the following statements are true or false by placing "T" or "F" to the left of the statement.

1. $\mathbf{G}$ is incompressible
2. $\mathbf{F}$ is incompressible
3. $\mathbf{G}$ is irrotational
4. $\mathbf{F}$ is irrotational

Note: *You can earn partial credit on this problem.*

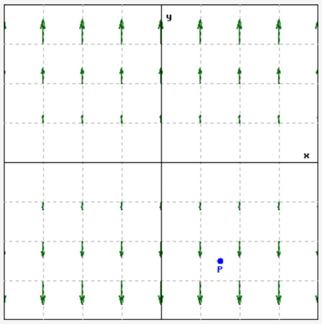
Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 3 attempts remaining.

Section 13.5: Problem 8

Previous | Problem List | Next

(1 point) Determine whether the divergence of each vector field (in green) at the indicated point P (in blue) is positive, negative, or zero.



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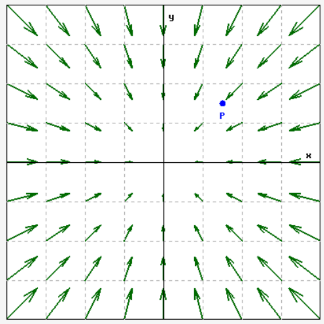

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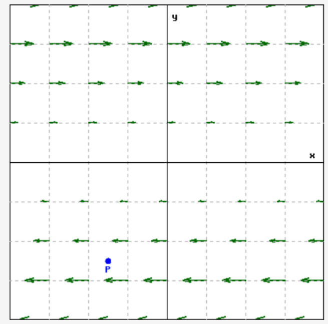

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(Click on a graph to enlarge it)

Note: *In order to get credit for this problem all answers must be correct.*

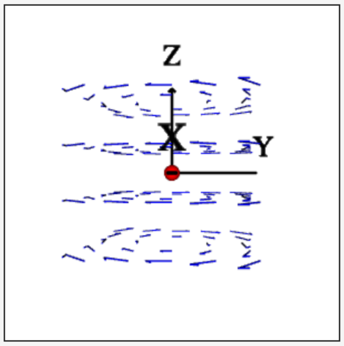
Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 4 attempts remaining.

Section 13.5: Problem 9

Previous | Problem List | Next

(1 point) Determine whether the curl of each vector field $\vec{F}$ at the origin (in red) is $\vec{0}$ or points in the same direction as $\pm\vec{i}$, $\pm\vec{j}$, or $\pm\vec{k}$.



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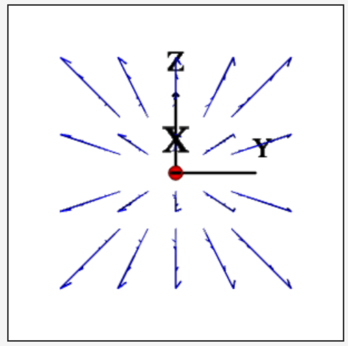

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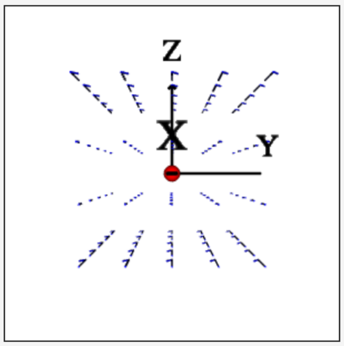

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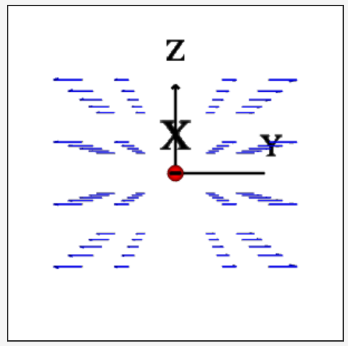

Choose

(Click and drag to rotate)

Note: *You can earn 50% partial credit for 2 - 3 correct answers.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 5 attempts remaining.

Section 13.6: Problem 1

Previous | Problem List | Next

(1 point) Match the parametric equations with the verbal descriptions of the surfaces by putting the letter of the verbal description to the left of the letter of the parametric equation.

1. $\mathbf{r}(u, v) = u\mathbf{i} + \cos v\mathbf{j} + \sin v\mathbf{k}$

2. $\mathbf{r}(u, v) = u\cos v\mathbf{i} + u\sin v\mathbf{j} + u^2\mathbf{k}$

3. $\mathbf{r}(u, v) = u\mathbf{i} + v\mathbf{j} + (2u - 3v)\mathbf{k}$

4. $\mathbf{r}(u, v) = u\mathbf{i} + u\cos v\mathbf{j} + u\sin v\mathbf{k}$

A. circular paraboloid
B. circular cylinder
C. cone
D. plane

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.6: Problem 2

Previous | Problem List | Next

(1 point) Consider $x = h(y,z)$ as a parametrized surface in the natural way. Write the **equation** of the tangent plane to the surface at the point $(-3,-5,4)$ given that $\frac{\partial h}{\partial y}(-5,4) = 5$ and $\frac{\partial h}{\partial z}(-5,4) = 5$.

______ .

Preview My Answers | Submit Answers

Section 13.6: Problem 3

Previous | Problem List | Next

(1 point) Consider the surface with parametric equations $\mathbf{r}(s,t) = \langle st, s+t, s-t \rangle$.

A) Find the **equation** of the tangent plane at $(2,3,1)$.

______ .

B) Find the surface area under the restriction $s^2 + t^2 \leq 1$

______

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.6: Problem 4

Previous | Problem List | Next

(1 point) Use Equation 9 from section 13.6 to find the surface area of that part of the plane $7x + 8y + z = 7$ that lies inside the elliptic cylinder $\frac{x^2}{49} + \frac{y^2}{64} = 1$

Surface Area = ______

Preview My Answers | Submit Answers

Section 13.6: Problem 5

Previous | Problem List | Next

(1 point) Write down the iterated integral which expresses the surface area of $z = y^5 \cos^7 x$ over the triangle with vertices $(-1, 1), (1, 1), (0, 2)$:

$$\int_a^b \int_{f(y)}^{g(y)} \sqrt{h(x, y)}\, dx dy$$

$a =$

$b =$

$f(y) =$

$g(y) =$

$h(x, y) =$

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

Section 13.6: Problem 6

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(1 point) The vector equation $\mathbf{r}(u, v) = u \cos v\mathbf{i} + u \sin v\mathbf{j} + v\mathbf{k}$, $0 \leq v \leq 3\pi$, $0 \leq u \leq 1$, describes a helicoid (spiral ramp). What is the surface area?

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Section 13.6: Problem 7

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(1 point) Find the surface area of the part of the sphere $x^2 + y^2 + z^2 = 25$ that lies above the cone $z = \sqrt{x^2 + y^2}$

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Section 13.6: Problem 8

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(1 point) Find the area cut out of the cylinder $x^2 + z^2 = 49$ by the cylinder $x^2 + y^2 = 49$.

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Section 13.6: Problem 9

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(1 point) If a parametric surface given by $\mathbf{r}_1(u,v) = f(u,v)\mathbf{i} + g(u,v)\mathbf{j} + h(u,v)\mathbf{k}$ and $-1 \le u \le 1, -1 \le v \le 1$, has surface area equal to 9, what is the surface area of the parametric surface given by $\mathbf{r}_2(u,v) = 4\mathbf{r}_1(u,v)$ with $-1 \le u \le 1, -1 \le v \le 1$?

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Section 13.6: Problem 10

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(1 point) Parameterize the plane through the point $(-5,-1,-5)$ with the normal vector $\langle -3,5,4\rangle$

$\vec{r}(s,t) =$

*(Use s and t for the parameters in your parameterization, and **enter your vector as a single vector, with angle brackets**: e.g., as **< 1 + s + t, s - t, 3 - t >**.)*

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Section 13.6: Problem 11

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(1 point) For a sphere parameterized using the spherical coordinates θ and ϕ, describe in words the part of the sphere given by the restrictions

$$\pi \le \theta \le 5\pi/4 \quad 0 \le \phi \le \pi/2$$

and

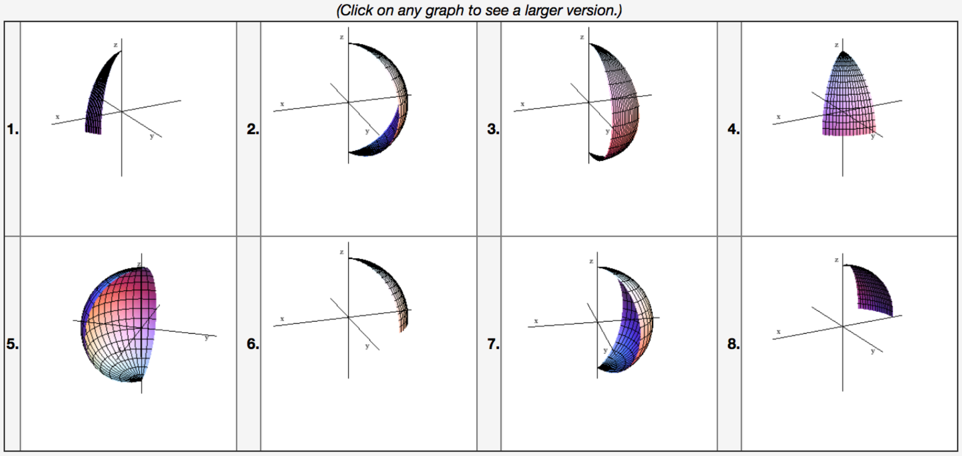
$$\pi/6 \le \theta \le \pi/4 \quad 0 \le \phi \le \pi/2.$$

Then pick the figures below that match the surfaces you described.

$\pi \le \theta \le 5\pi/4 \quad 0 \le \phi \le \pi/2$: ?

$\pi/6 \le \theta \le \pi/4 \quad 0 \le \phi \le \pi/2$: ?

(Click on any graph to see a larger version.)



Note: *You can earn partial credit on this problem.*

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You have attempted this problem 0 times.
You have 3 attempts remaining.

Section 13.6: Problem 12

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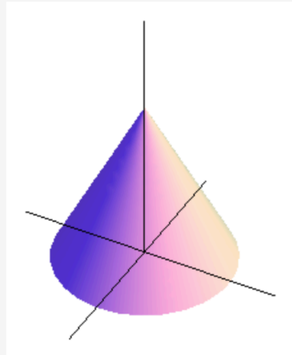
(1 point) Consider the cone shown below.



If the height of the cone is 2 and the base radius is 3, write a parameterization of the cone in terms of $r = s$ and $\theta = t$.

$x(s, t) =$ _____ ,
$y(s, t) =$ _____ , and
$z(s, t) =$ _____ , with
_____ $\leq s \leq$ _____ and
_____ $\leq t \leq$ _____ .

Note: *You can earn partial credit on this problem.*

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Section 13.7: Problem 1

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(1 point) Evaluate $\int\int_S \sqrt{1 + x^2 + y^2}\, dS$ where S is the helicoid: $\mathbf{r}(u, v) = u\cos(v)\,\mathbf{i} + u\sin(v)\,\mathbf{j} + v\,\mathbf{k}$, with $0 \leq u \leq 1, 0 \leq v \leq 2\pi$

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Section 13.7: Problem 2

Previous | Problem List | Next

(1 point) Let S be the part of the plane $3x + 4y + z = 3$ which lies in the first octant, oriented upward. Find the flux of the vector field $\mathbf{F} = 4\mathbf{i} + 2\mathbf{j} + 4\mathbf{k}$ across the surface S.

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Section 13.7: Problem 3

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(1 point) A fluid has density 3 $\mathrm{kg/m^3}$ and flows in a velocity field $\mathbf{v} = -y\,\mathbf{i} + x\,\mathbf{j} + 3z\,\mathbf{k}$ where $x, y,$ and z are measured in meters and the components of $\mathbf{v}$ in meters per second. Find the rate of flow outward through the sphere $x^2 + y^2 + z^2 = 16$

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Section 13.7: Problem 4

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(1 point) Let M be the closed surface that consists of the hemisphere

$$M_1 : x^2 + y^2 + z^2 = 1, \quad z \geq 0,$$

and its base

$$M_2 : x^2 + y^2 \leq 1, \quad z = 0.$$

Let $\mathbf{E}$ be the electric field defined by $\mathbf{E} = \langle 19x, 19y, 19z \rangle$. Find the electric flux across M. Write the integral over the hemisphere using spherical coordinates, and use the outward pointing normal.

$$\iint_{M_1} \mathbf{E} \cdot d\mathbf{S} = \int_a^b \int_c^d f(\theta, \phi)\, d\theta\, d\phi,$$

where

$a =$ ____ , $b =$ ____ , $c =$ ____ , $d =$ ____ ,

Using t for θ and p for ϕ,
$f(\theta, \phi) =$ ____

$\iint_{M_1} \mathbf{E} \cdot d\mathbf{S} =$ ____

$\iint_{M_2} \mathbf{E} \cdot d\mathbf{S} =$ ____ , so

$\iint_{M} \mathbf{E} \cdot d\mathbf{S} =$ ____ .

Note: *You can earn partial credit on this problem.*

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Section 13.7: Problem 5

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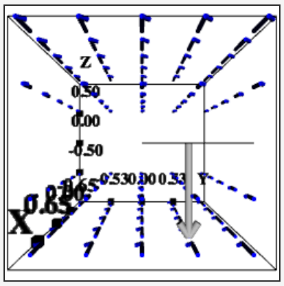
(1 point) Determine whether the flux of the vector field $\vec{F}$ through each surface is positive, negative, or zero. In each case, the orientation of the surface is indicated by the gray normal vector.



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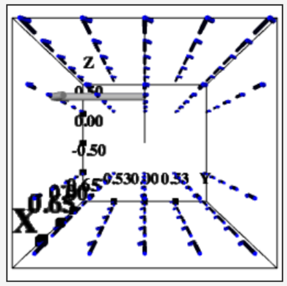

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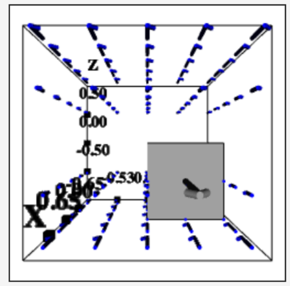

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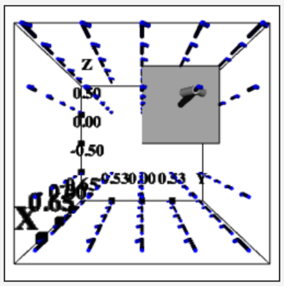

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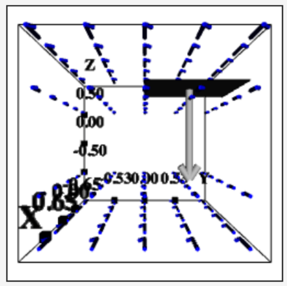

Choose

(Click and drag to rotate)

Note: *You can earn 60% partial credit for 3 - 4 correct answers.*

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have 4 attempts remaining.

Section 13.7: Problem 6

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(1 point) Compute the flux of the vector field $\vec{F} = 2y\vec{i} + \vec{j} - 2xz\vec{k}$ through the surface S, which is the surface $y = x^2 + z^2$, with $x^2 + z^2 \leq 9$, oriented in the positive y-direction.

flux =

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Section 13.7: Problem 7

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(1 point) Compute the flux of the vector field $\vec{F} = 6x^2y^2z\vec{k}$ through the surface S which is the cone $\sqrt{x^2+y^2} = z$, with $0 \le z \le R$, oriented downward.

(a) Parameterize the cone using cylindrical coordinates (write θ as *theta*).

$x(r, \theta) =$

$y(r, \theta) =$

$z(r, \theta) =$

with $\le r \le$

and $\le \theta \le$

(b) With this parameterization, what is $d\vec{A}$?

$d\vec{A}$ =

(c) Find the flux of $\vec{F}$ through S.

flux =

Note: *You can earn partial credit on this problem.*

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Section 13.7: Problem 8

Previous | Problem List | Next

(1 point) Compute the flux of $\vec{F} = x\vec{i} + y\vec{j} + z\vec{k}$ through the curved surface of the cylinder $x^2 + y^2 = 16$ bounded below by the plane $x + y + z = 1$, above by the plane $x + y + z = 3$, and oriented away from the z-axis.

flux =

Preview My Answers | Submit Answers

You have attempted this problem 0 times.
You have unlimited attempts remaining.

Section 13.7: Problem 9

Previous | Problem List | Next

(1 point)

Calculate $\iint_S f(x,y,z)\, dS$ for

$$y = 5 - z^2, \qquad 0 \le x \le 5,\ 0 \le z \le 5; \qquad f(x,y,z) = z$$

$\iint_S f(x,y,z)\, dS =$

Preview My Answers | Submit Answers