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← MC 113, section A, Spring 2020

 INSTRUCTOR

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## 12.1 Sistemas 3-D (Homework)

### Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
POINTS	1/1	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	0.99/2	-/0	1/0	-/2	-/2	-/2	-/2	-/2	-/2
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	★	★					

#### TOTAL SCORE

18.99/31 **61.3%**

**Due Date** Past Due

**TUE, FEB 4, 2020**  
 11:56 PM CST

 [Request Extension](#)

 **Description**



### Assignment Submission & Scoring

#### Assignment Submission

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

#### Assignment Scoring

The due date for this assignment has passed.

Your work can be viewed below, but no changes can be made.

**Important!** Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may not grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

 Request Extension

1.

1/1 points

Previous Answers

SCALC8 12.1.001.

 My Notes

Ask Your Teacher

Suppose you start at the origin, move along the  $x$ -axis a distance of 6 units in the positive direction, and then move downward along the  $z$ -axis a distance of 8 units. What are the coordinates of your position?

$(x, y, z) = ($

6, 0, -8

 )

2.

2/2 points

Previous Answers

SCALC8 12.1.005.

 My Notes

Ask Your Teacher

What does the equation  $x = 8$  represent in  $\mathbb{R}^2$ ?

- ☐ a point
- ☒ a line
- ☐ a plane
- ☐ a circle



What does it represent in  $\mathbb{R}^3$ ?

- ☐ a point
- ☐ a line
- ☒ a plane
- ☐ a circle



3.

2/2 points ▼

Previous Answers

SCALC8 12.1.007.

My Notes

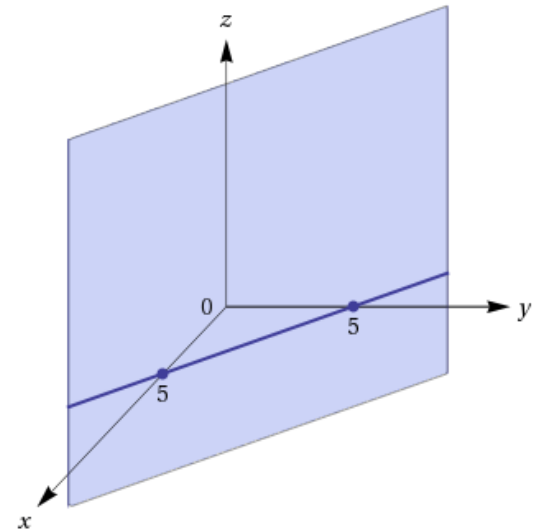
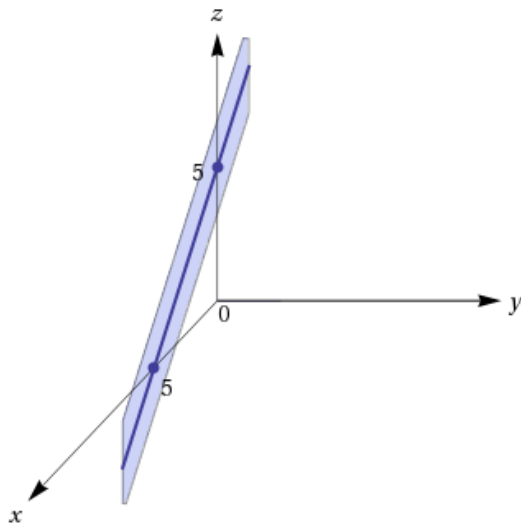
Ask Your Teacher ▼

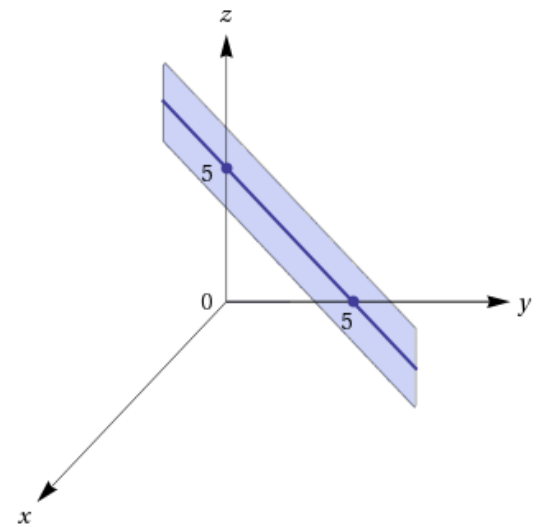
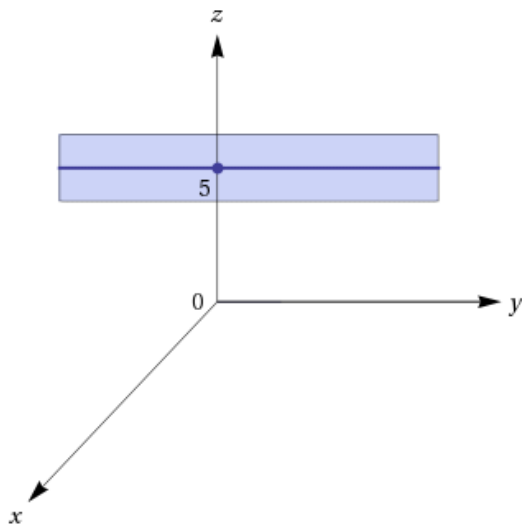
Describe the surface in  $\mathbb{R}^3$  represented by the equation  $x + y = 5$ .

- ☐ This is the set  $\{(x, 5 - x, z) | x \in \mathbb{R}, z \in \mathbb{R}\}$  which is a horizontal plane that intersects the  $xz$ -plane in the line  $y = 5 - x, z = 0$ .
- ☐ This is the set  $\{(x, 5 - x, z) | x \in \mathbb{R}, z \in \mathbb{R}\}$  which is a vertical plane that intersects the  $xz$ -plane in the line  $y = 5 - x, z = 0$ .
- ☒ This is the set  $\{(x, 5 - x, z) | x \in \mathbb{R}, z \in \mathbb{R}\}$  which is a vertical plane that intersects the  $xy$ -plane in the line  $y = 5 - x, z = 0$ .
- ☐ This is the set  $\{(x, y, 5 - x - y) | x \in \mathbb{R}, y \in \mathbb{R}\}$  which is a vertical plane that intersects the  $xy$ -plane in the line  $y = 5 - x, z = 0$ .
- ☐ This is the set  $\{(x, 5 - x, z) | x \in \mathbb{R}, z \in \mathbb{R}\}$  which is a horizontal plane that intersects the  $xy$ -plane in the line  $y = 5 - x, z = 0$ .



Sketch the surface.





4.

2/2 points

Previous Answers

SCALC8 12.1.009.

My Notes

Ask Your Teacher

Find the lengths of the sides of the triangle  $PQR$ . $P(3, -2, -1), Q(7, 0, 3), R(9, -4, -1)$ 

\$\$\$6

 $|PQ| =$ 



\$\$\$6

 $|QR| =$ 



\$\$\$ \sqrt{40}

 $|RP| =$ 



Is it a right triangle?

☐ Yes☒ No

Is it an isosceles triangle?

☒ Yes☐ No

5.

2/2 points

Previous Answers

SCALC8 12.1.033.

My Notes

Ask Your Teacher

Describe in words the region of  $\mathbb{R}^3$  represented by the equation.

$$x^2 + y^2 + z^2 = 9$$

The equation  $x^2 + y^2 + z^2 = 9$  is equivalent to  $\sqrt{x^2 + y^2 + z^2} = 3$ , so the region consists of those points whose distance from

$$(x, y, z) = ($$

$$0, 0, 0$$

the origin is 3. This is the set of all points on a sphere with radius 3 and center.

6.

2/2 points

Previous Answers

SCALC8 12.1.015.MI.

My Notes

Ask Your Teacher

Find an equation of the sphere that passes through the point  $(5, 3, -1)$  and has center  $(3, 8, 5)$ .

$$(x-3)^2 + (y-8)^2 + (z-5)^2 = 65$$



7.

2/2 points

Previous Answers

SCALC8 12.1.013.

My Notes

Ask Your Teacher

Find an equation of the sphere with center  $(-5, 4, 7)$  and radius 6.

$$(x+5)^2 + (y-4)^2 + (z-7)^2 = 36$$



What is the intersection of this sphere with the  $yz$ -plane?

$$(y-4)^2 + (z-7)^2 = 11$$

,  $x = 0$

8.

2/2 points

Previous Answers

SCALC8 12.1.017.

My Notes

Ask Your Teacher

Write the equation of the sphere in standard form.

$$x^2 + y^2 + z^2 + 2x - 6y - 4z = 11$$

$$(x+1)^2 + (y-3)^2 + (z-2)^2 = 25$$



Find its center and radius.

$$(-1, 3, 2)$$

center

(x, y, z) = (



)

$$5$$

radius



9.

2/2 points

Previous Answers

SCALC8 12.1.031.

My Notes

Ask Your Teacher

Describe in words the region of  $\mathbb{R}^3$  represented by the equation(s).

$$x^2 + y^2 = 4, z = -3$$

Because  $z = -3$ , all points in the region must lie in the horizontal plane  $z = -3$ . In addition,  $x^2 + y^2 = 4$ , so the region consists of all points that lie on a circle with radius 2 and center on the  $z$ -axis that is contained in the plane  $z = -3$ .

10.

0.99/2 points

Previous Answers

SCALC8 12.1.035.

My Notes

Ask Your Teacher

Describe in words the region of  $\mathbb{R}^3$  represented by the inequalities.

$$1 \leq x^2 + y^2 + z^2 \leq 3$$

The inequalities  $1 \leq x^2 + y^2 + z^2 \leq 3$  are equivalent to  $1 \leq \sqrt{x^2 + y^2 + z^2} \leq \sqrt{3}$ , so the region consists of those points whose distance from the origin is at least

1

3



and at most

3

3

This is the set of all points on or between spheres with radii

(entered as a comma-separated list) and centers  $(x, y, z) = (\text{No Response})$ .

11. -/0 points **SCALC8 12.1.037.**

My Notes

Ask Your Teacher

Describe in words the region of  $\mathbb{R}^3$  represented by the equations or inequalities.

$$x^2 + z^2 \leq 36$$

Here  $x^2 + z^2 \leq 36$  or equivalently  $\sqrt{x^2 + z^2} \leq 6$  which describes the set of all points in  $\mathbb{R}^3$  whose distance from the (No Response)-axis is at most (No Response). Thus, the inequality represents the region consisting of all points on or inside a (No Response) of radius (No Response) with axis the (No Response)-axis.

12. 1/0 points **SCALC8 12.1.040.**

My Notes

Ask Your Teacher

Write an inequality to describe the region.

The solid cylinder that lies on or below the plane  $z = 5$  and on or above the disk in the  $xy$ -plane with center the origin and radius 2

- ☐  $x^2 + y^2 \leq 2, 0 \leq z \leq 5$
- ☒  $x^2 + y^2 \leq 4, 0 \leq z \leq 5$
- ☐  $x^2 + y^2 + z^2 \leq 5, 0 \leq z \leq 2$
- ☐  $x^2 + y^2 + z^2 \leq 4, 0 \leq z \leq 5$
- ☐ none of these

13. -/2 points **SCALC8 12.1.042.**

My Notes

Ask Your Teacher

Write an inequality to describe the region.

The solid upper hemisphere of the sphere of radius 5 centered at the origin

- ☐  $z \leq 0, x^2 + y^2 + z^2 \leq 25$
- ☐  $z \geq 0, x^2 + y^2 + z^2 \leq 25$
- ☐  $z \geq 0, x^2 + y^2 + z^2 \geq 25$
- ☐  $z \geq 0, \sqrt{x^2 + y^2 + z^2} \leq 25$
- ☐ none of these

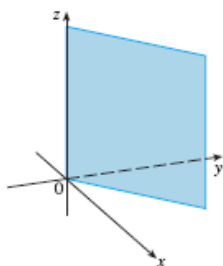
14.

-2 points

SCALC8 12.1.AE.003.

My Notes

Ask Your Teacher


[Video Example](#)

**EXAMPLE 2** Describe and sketch the surface in  $\mathbb{R}^3$  represented by the equation  $y = 6x$ .

**SOLUTION** The equation represents the set of all points in  $\mathbb{R}^3$  whose  $y$ -coordinate is  $(\text{No Response})$  times their  $x$ -coordinate, that is,  $\{(x, 6x, z) \mid x \in \mathbb{R}, z \in \mathbb{R}\}$ . This is a  $(\text{No Response})$  plane that intersects the  $xy$ -plane in the line  $y = (\text{No Response})$ ,  $z = (\text{No Response})$ . The portion of this plane that lies in the first octant is sketched in the figure.

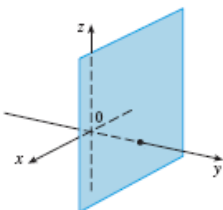
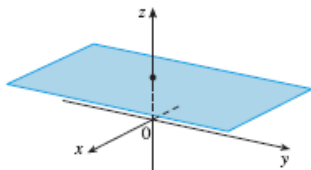
15.

-2 points

SCALC8 12.1.AE.001.

My Notes

Ask Your Teacher


[Video Example](#)

**EXAMPLE 1** What surfaces in  $\mathbb{R}^3$  are represented by the following equations?

(a)  $z = 1$

(b)  $y = 4$

**SOLUTION**

(a) The equation  $z = 1$  represents the set

$\{(x, y, z) \mid z = (\text{No Response})\}$ , which is the set of all points in  $\mathbb{R}^3$  whose  $z$ -coordinate is  $(\text{No Response})$ . This is the horizontal plane that is parallel to the  $xy$ -plane and  $(\text{No Response})$  units  $(\text{No Response})$  it as in the first figure.

(b) The equation  $y = 4$  represents the set of all points in  $\mathbb{R}^3$  whose  $(\text{No Response})$  is  $(\text{No Response})$ . This is the vertical plane that is parallel to the  $xz$ -plane and  $(\text{No Response})$  units to the right of it as in the second figure.

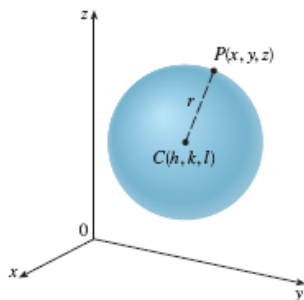
16.

-2 points

SCALC8 12.1.AE.005.

My Notes

Ask Your Teacher


[Video Example](#)

**EXAMPLE 5** Find an equation of a sphere with radius  $r$  and center  $C(h, k, l)$ .

**SOLUTION** By definition, a sphere is the set of all points  $P(x, y, z)$  whose distance from  $C$  is  $r$ . (See the figure.) Thus, in terms of  $r$ ,  $P$  is on the sphere if and only if  $|PC| = (\text{No Response})$ .

Squaring both sides, in terms of radius  $r$ , we have  $|PC|^2 = (\text{No Response})$ .

In terms of Cartesian coordinates and radius  $r$ , the equation of a sphere is  $(x - (\text{No Response}))^2 + (y - k)^2 + (z - (\text{No Response}))^2 = (\text{No Response})$ .



17.

-2 points ▾

SCALC8 12.1.003.MI.SA.

 My Notes

Ask Your Teacher ▾

*This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.*

**Tutorial Exercise**

Which of the points  $A(5, 0, 5)$ ,  $B(5, 7, 2)$ , and  $C(2, 6, 3)$  is closest to the  $yz$ -plane? Which point lies in the  $xz$ -plane?

**Step 1**

Recall that the distance between a point and the  $yz$ -plane is the absolute value of its (No Response)-coordinate.

18.

-2 points ▾

SCALC8 12.1.012.

 My Notes

Ask Your Teacher ▾

Find the distance from  $(4, -9, 5)$  to each of the following.

(a) the  $xy$ -plane(No Response)(b) the  $yz$ -plane(No Response)(c) the  $xz$ -plane(No Response)(d) the  $x$ -axis(No Response)(e) the  $y$ -axis(No Response)(f) the  $z$ -axis(No Response)

19.

-/0 points

SCALC8 12.1.004.

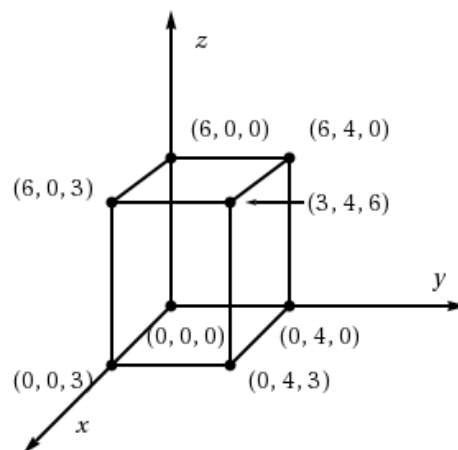
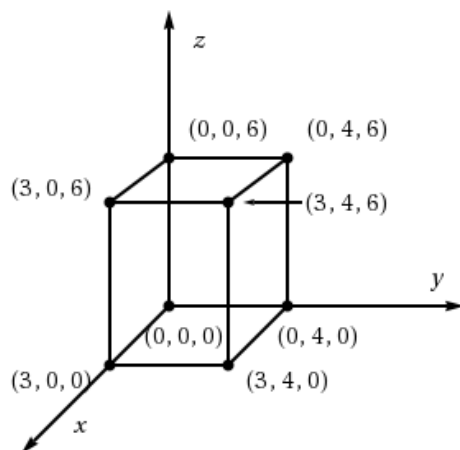
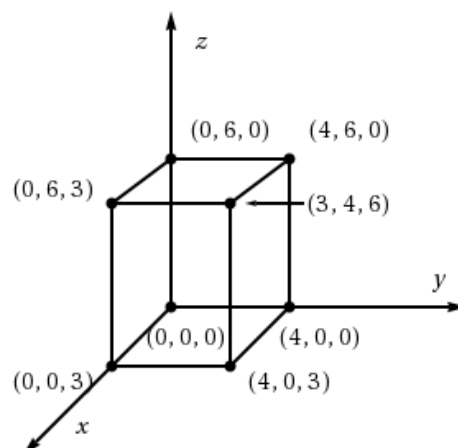
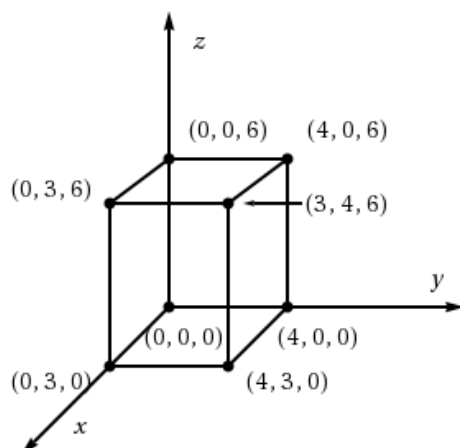
My Notes

Ask Your Teacher

Consider the point.

 $(3, 4, 6)$ What is the projection of the point on the  $xy$ -plane? $(x, y, z) = \left( \boxed{\text{No Response}} \right)$ What is the projection of the point on the  $yz$ -plane? $(x, y, z) = \left( \boxed{\text{No Response}} \right)$ What is the projection of the point on the  $xz$ -plane? $(x, y, z) = \left( \boxed{\text{No Response}} \right)$ 

Draw a rectangular box with the origin and  $(3, 4, 6)$  as opposite vertices and with its faces parallel to the coordinate planes. Label all vertices of the box.



Find the length of the diagonal of the box.

(No Response)

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