CENGAGE | WEBASSIGN

14.1 Funciones Varias Variables (Homework)

INSTRUCTOR
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Universidad Francisco Marroquin

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
POINTS	–/2	–/1.5	–/1	–/1	–/1	–/0	–/1	–/1	–/1	–/1	–/1	–/0	–/1	–/1	–/1	–/1	–/1	–/1

TOTAL SCORE

–/40	0.0%

Due Date

SAT, FEB 22, 2020
11:59 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

Your last submission is used for your score.

1. –/2 points **SCALCET8 14.1.003.** My Notes Ask Your Teacher

A manufacturer has modeled its yearly production function P (the monetary value of its entire production in millions of dollars) as a Cobb-Douglas function

$$P(L, K) = 1.47L^{0.65}K^{0.35}$$

where L is the number of labor hours (in thousands) and K is the invested capital (in millions of dollars). Find $P(125, 45)$ and interpret it. (Round your answers to one decimal place.)

$P(125, 45) =$ _____ , so when the manufacturer invests $ _____ million in capital and _____ thousand hours of labor are completed yearly, the monetary value of the production is about $ _____ million.

2. –/1.5 points **SCALCET8 14.1.009.** My Notes Ask Your Teacher

Let $g(x, y) = \cos(x + 5y)$.

(a) Evaluate $g(5, -1)$.

$g(5, -1) =$ _____

(b) Find the domain of g.

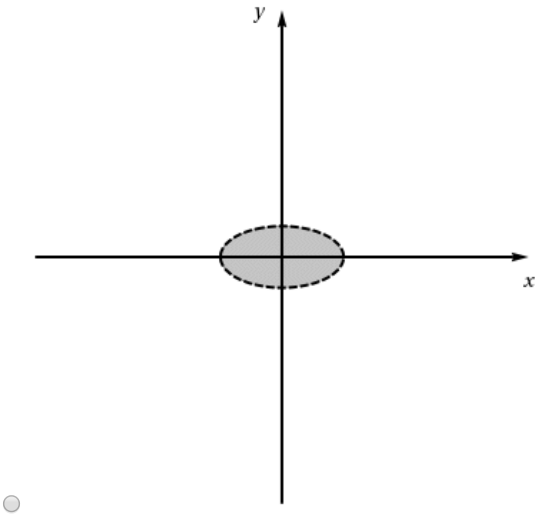
- $-5 \le x \le 5, -1 \le y \le 1$
- $\mathbb{R}^2$
- $\frac{\pi}{2} \le x + 5y \le \frac{\pi}{2}$
- $-1 \le x + 5y \le 1$
- $-1 \le x \le 1, \frac{1}{5} \le y \le \frac{1}{5}$

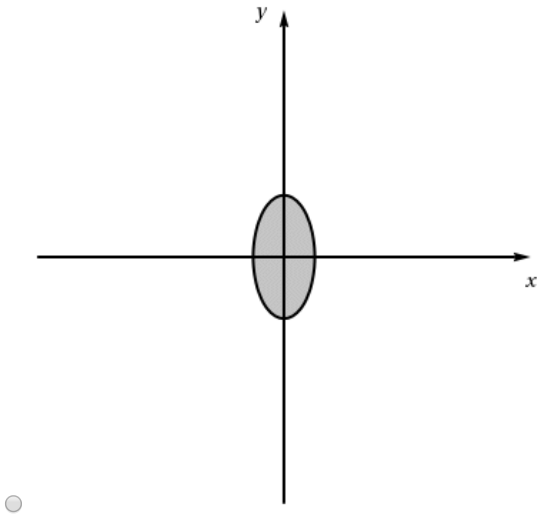
(c) Find the range of g. (Enter your answer using interval notation.)

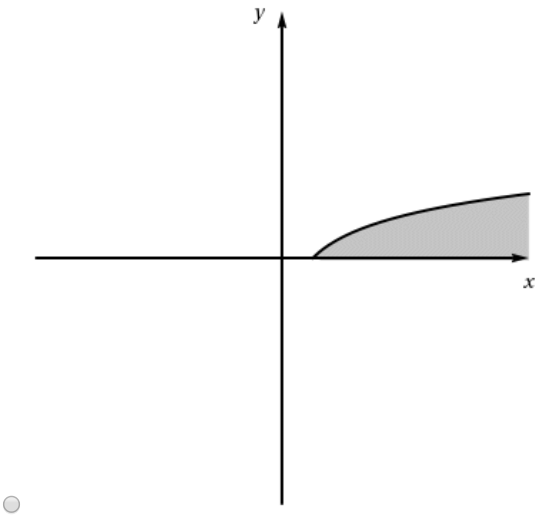
3. –/1 points SCALCET8 14.1.015. My Notes Ask Your Teacher

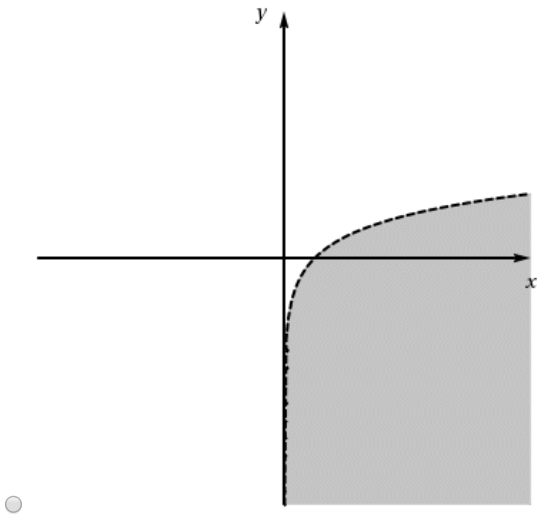
Find and sketch the domain of the function.

$f(x, y) = \ln(4 - x^2 - 4y^2)$





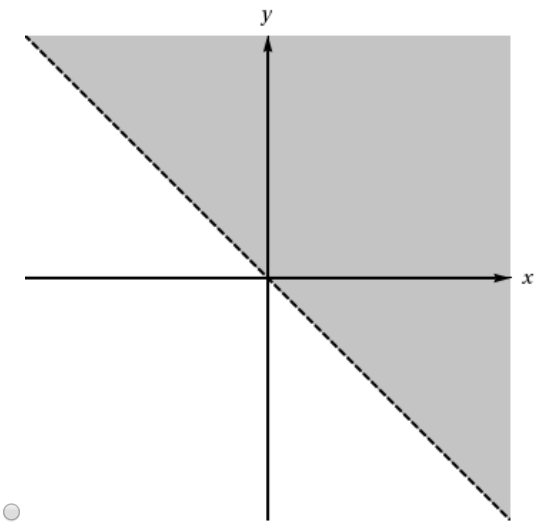


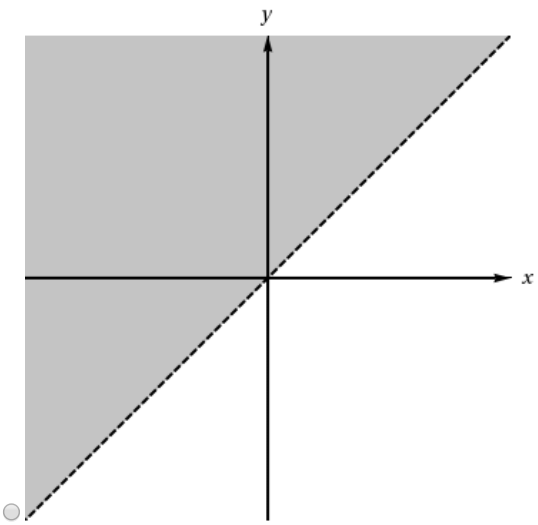


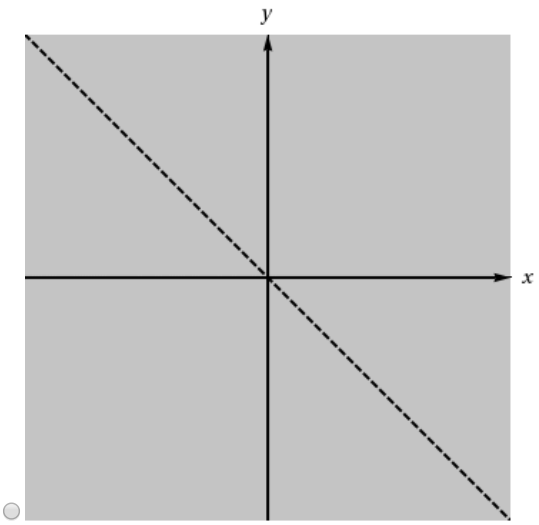
4. –/1 points SCALCET8 14.1.017. My Notes Ask Your Teacher

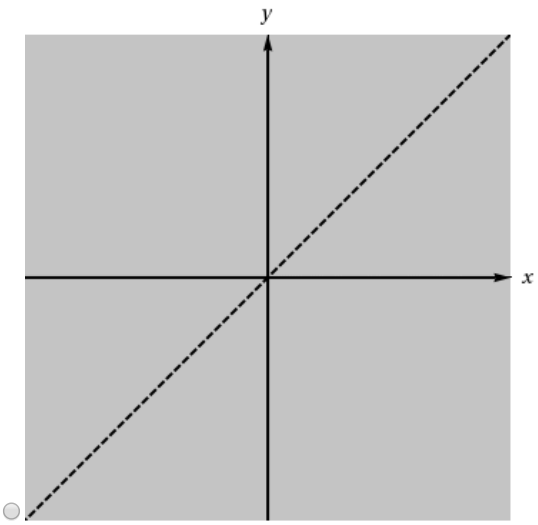
Find and sketch the domain of the function.

$$g(x, y) = \frac{x - y}{x + y}$$





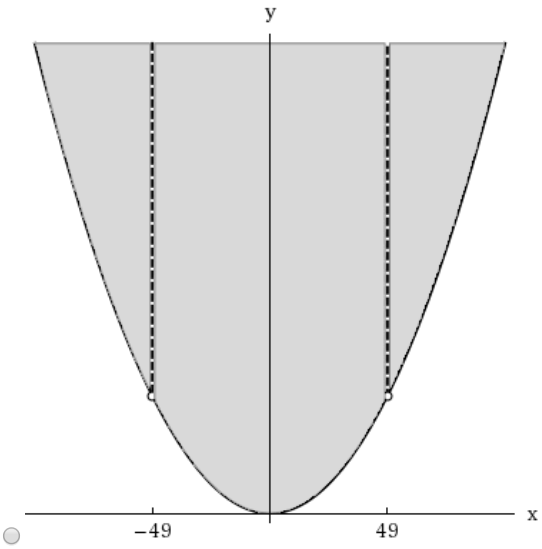


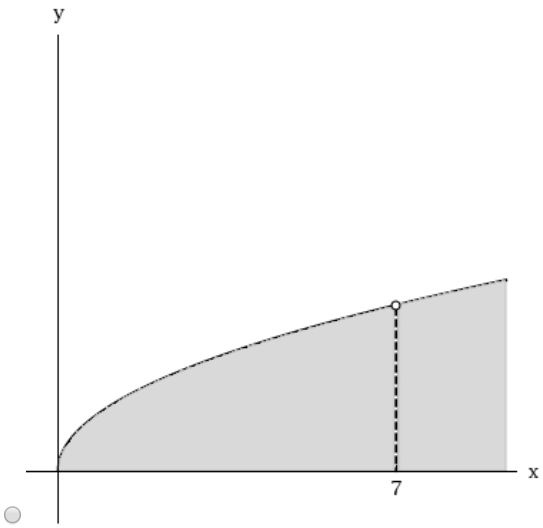


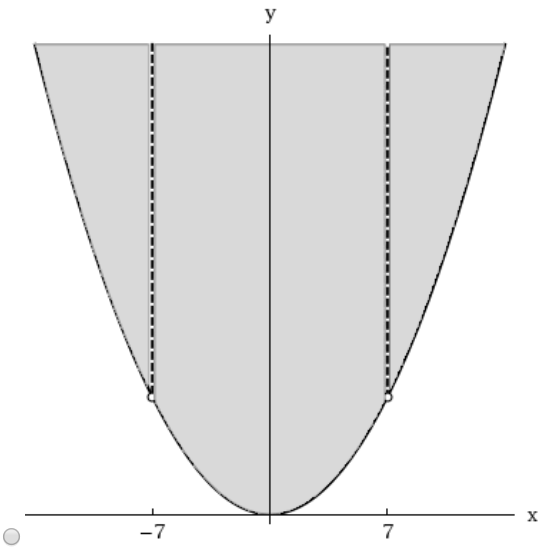
5. –/1 points SCALCET8 14.1.019.MI. My Notes Ask Your Teacher

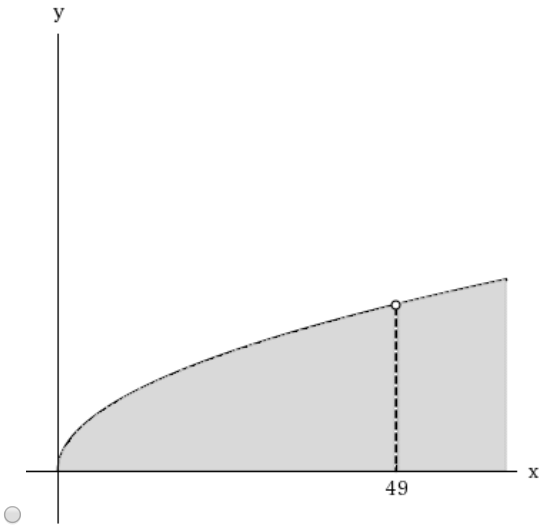
Find and sketch the domain of the function.

$$f(x, y) = \frac{\sqrt{y - x^2}}{49 - x^2}$$









6. –/0 points SCALCET8 14.1.019.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

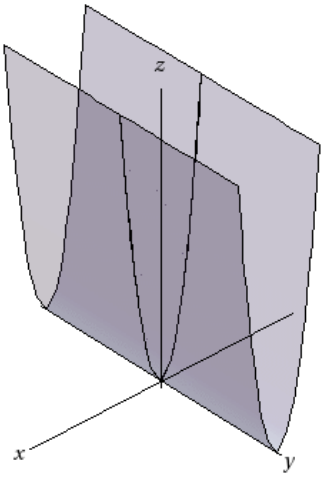
Find and sketch the domain of the function.

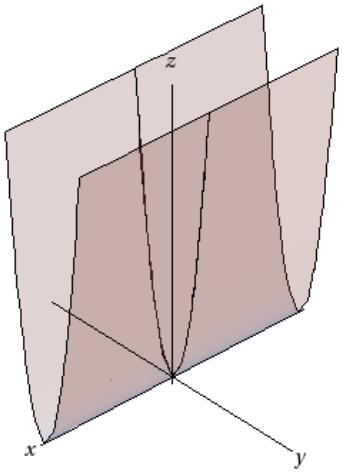
$$f(x, y) = \frac{\sqrt{y - x^2}}{16 - x^2}$$

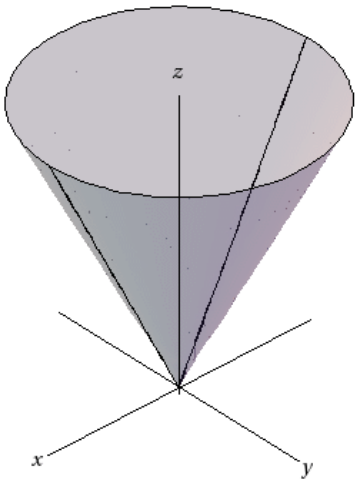
7. –/1 points **SCALCET8 14.1.024.** My Notes Ask Your Teacher

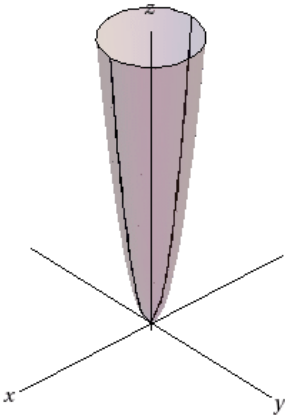
Sketch the graph of the function.

$f(x, y) = x^2$





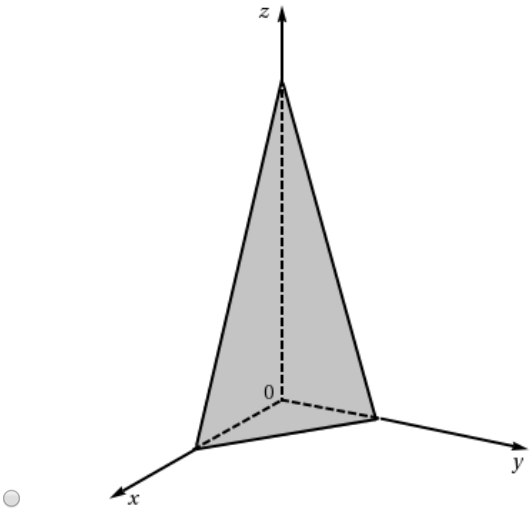


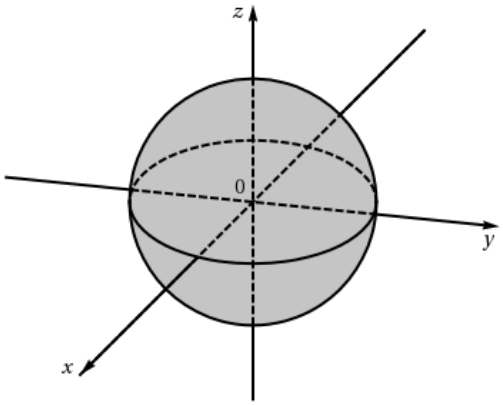


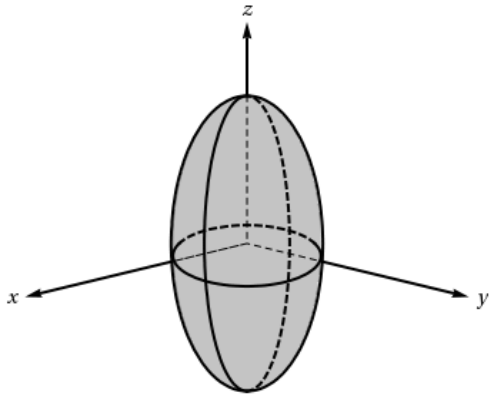
8. –/1 points SCALCET8 14.1.025. My Notes Ask Your Teacher

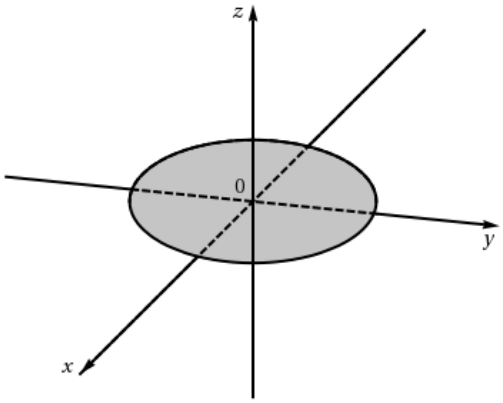
Sketch the graph of the function.

$f(x, y) = 12 - 4x - 5y$





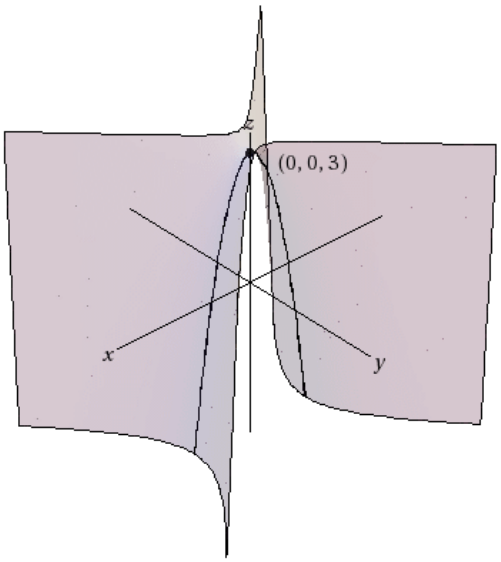


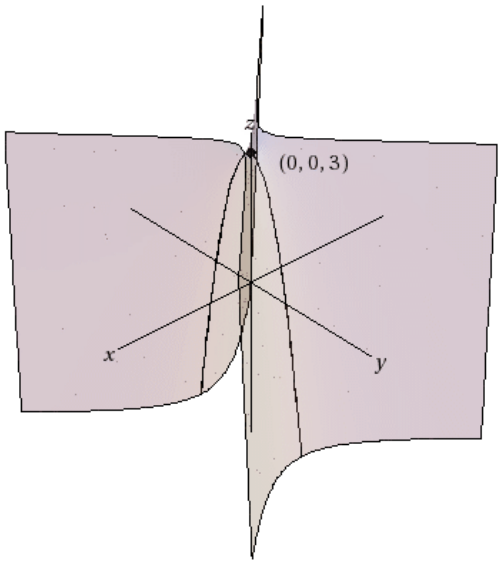


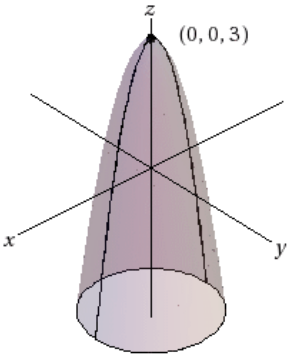
9. –/1 points **SCALCET8 14.1.028.** My Notes Ask Your Teacher

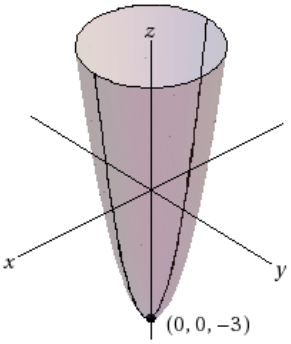
Sketch the graph of the function.

$f(x, y) = 3 - x^2 - y^2$





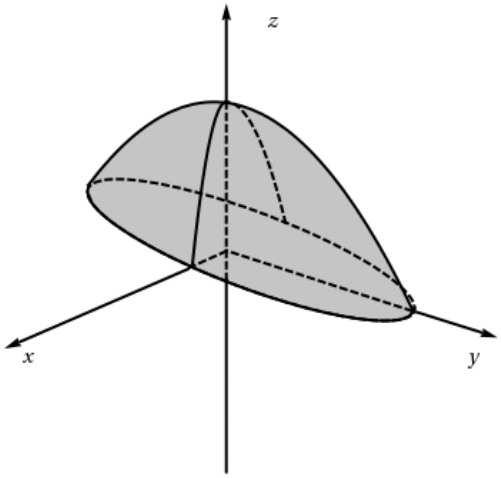


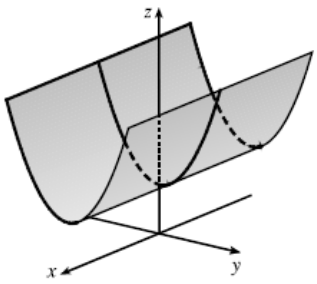


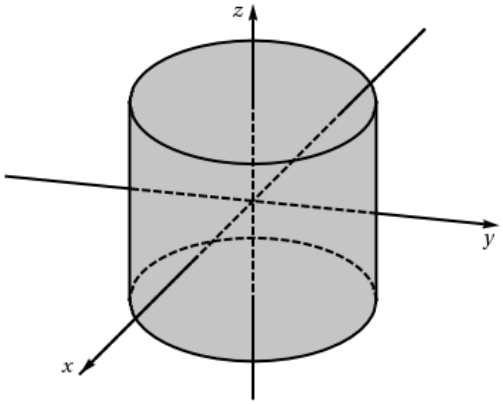
10. –/1 points SCALCET8 14.1.031. My Notes Ask Your Teacher

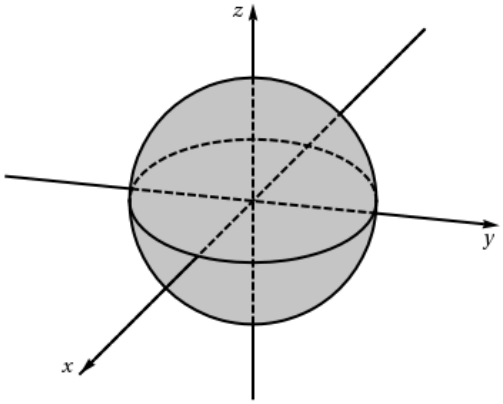
Sketch the graph of the function.

$f(x, y) = \sqrt{9 - 9x^2 - y^2}$



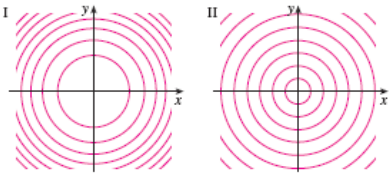






11. –/1 points SCALCET8 14.1.036.MI. My Notes Ask Your Teacher

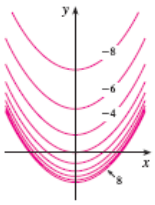
Two contour maps are shown. One is for a function f whose graph is a cone. The other is for a function g whose graph is a paraboloid. Which is which, and why?

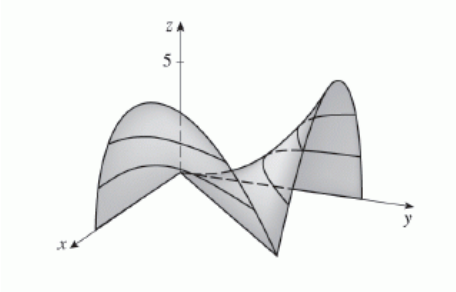


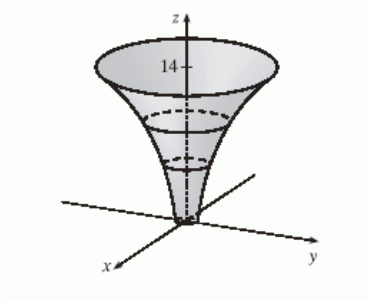
- Map II is the paraboloid. Map I is the cone. The cone's z-values change at a constant rate.
- Map I is the paraboloid. Map II is the cone. The paraboloid's z-values change at a constant rate.
- Map II is the paraboloid. Map I is the cone. The paraboloid's z-values change at a constant rate.
- Map I is the paraboloid. Map II is the cone. The cone's z-values change at a constant rate.

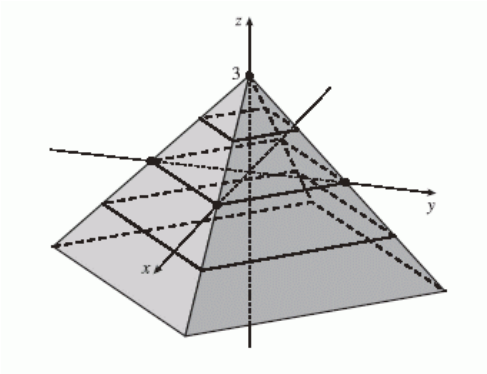
12. –/0 points SCALCET8 14.1.042. My Notes Ask Your Teacher

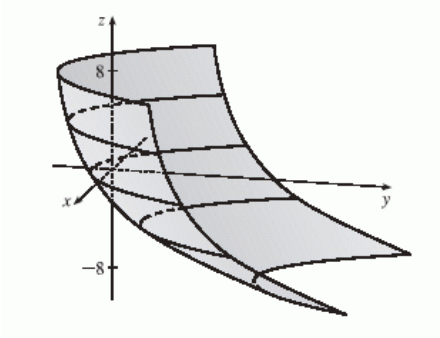
A contour map of a function is shown. Use it to make a rough sketch of the graph of f.





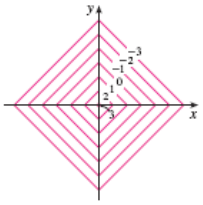


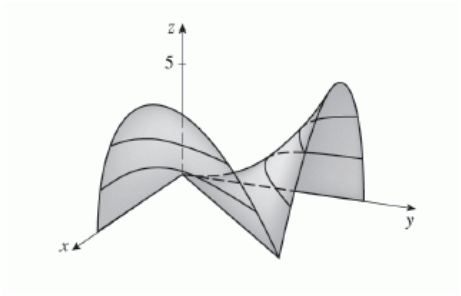


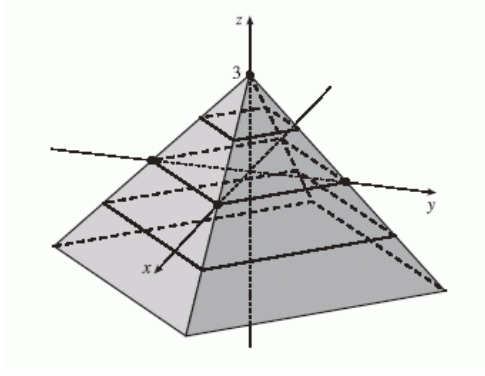


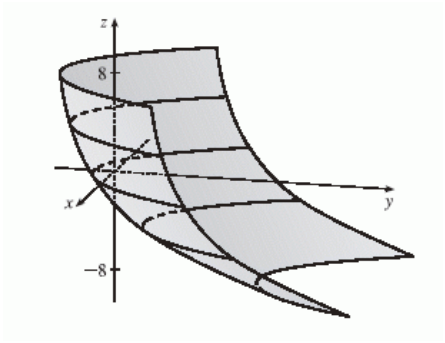
13. –/1 points SCALCET8 14.1.044. My Notes Ask Your Teacher

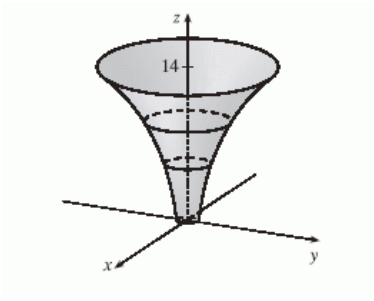
A contour map of a function is shown. Use it to make a rough sketch of the graph of f.







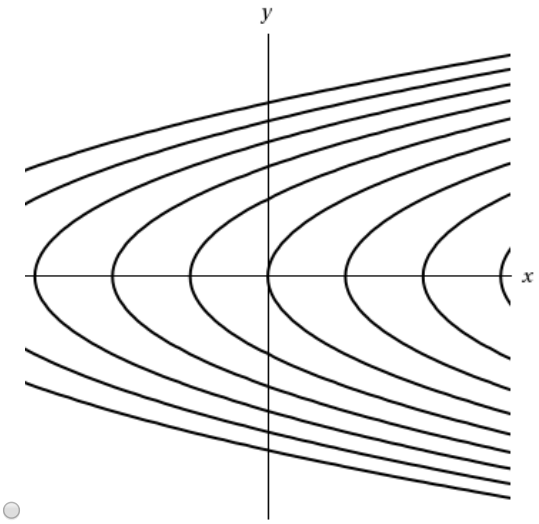


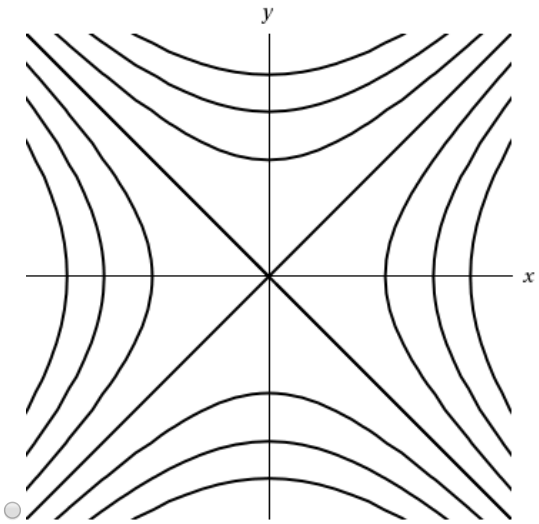


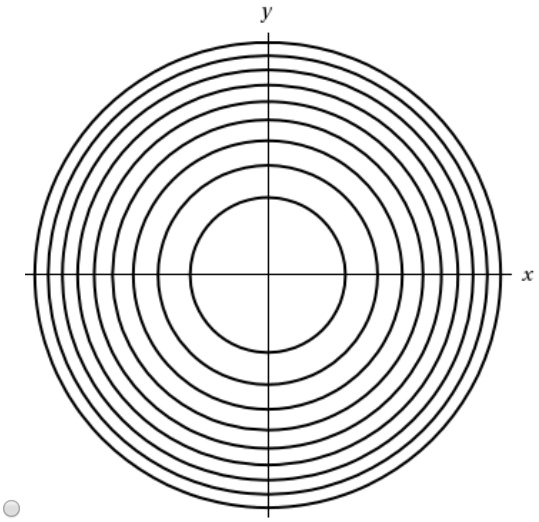
14. –/1 points **SCALCET8 14.1.045.** My Notes Ask Your Teacher

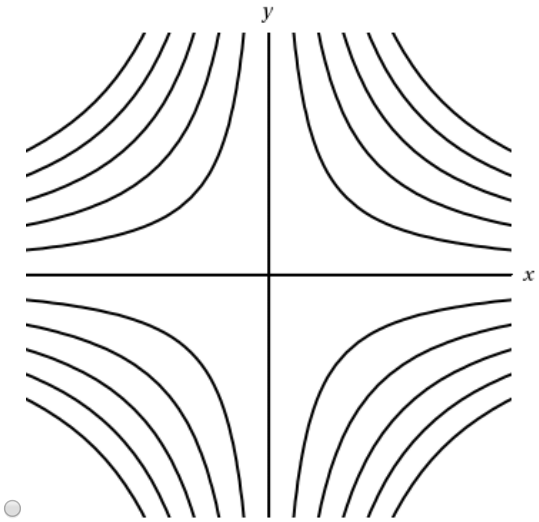
Draw a contour map of the function showing several level curves.

$f(x, y) = x^2 - y^2$





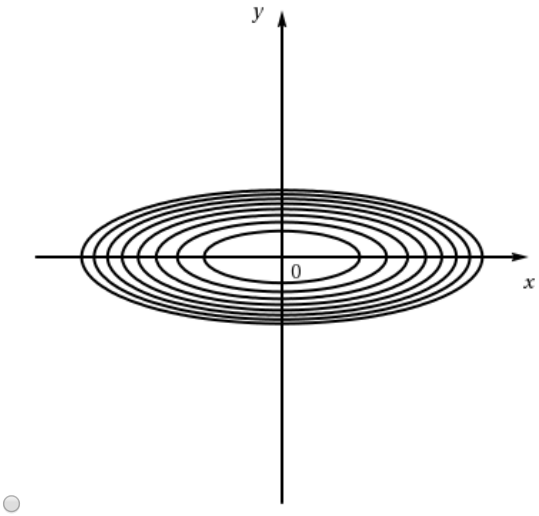


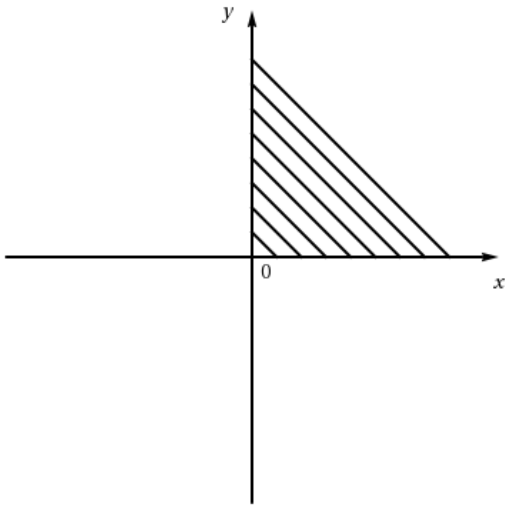


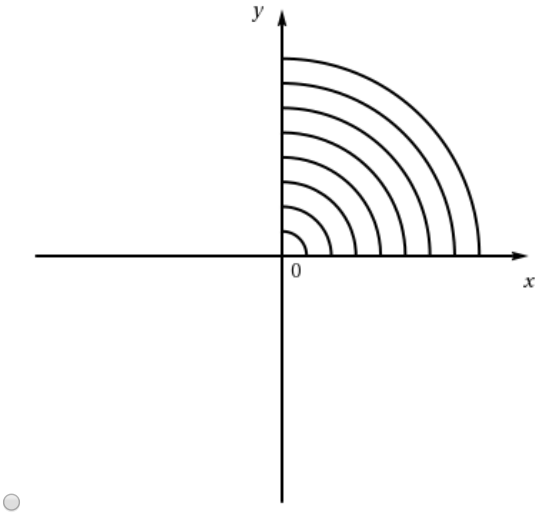
15. –/1 points SCALCET8 14.1.053. My Notes Ask Your Teacher

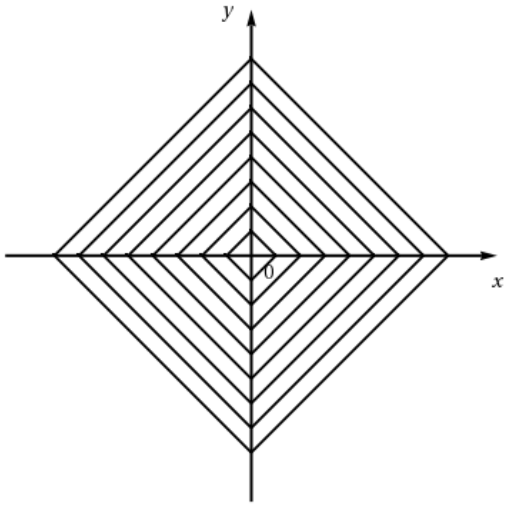
Sketch a contour map of the function.

$f(x, y) = x^2 + 9y^2$

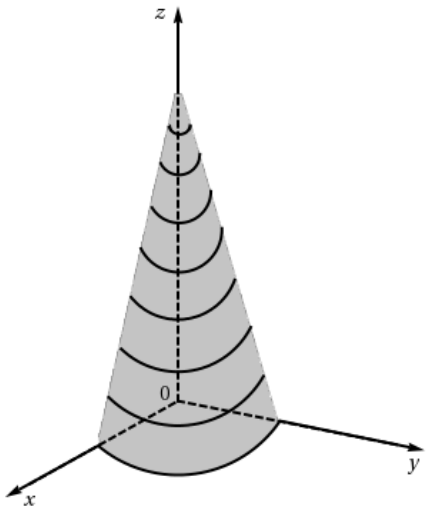


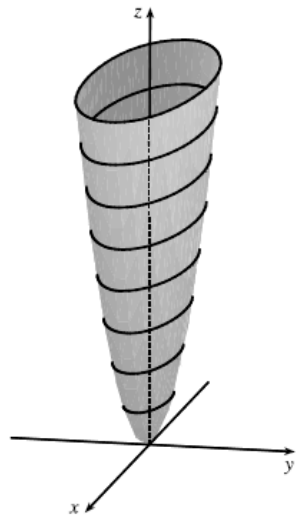


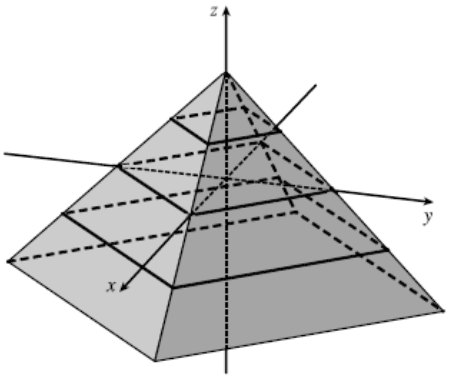


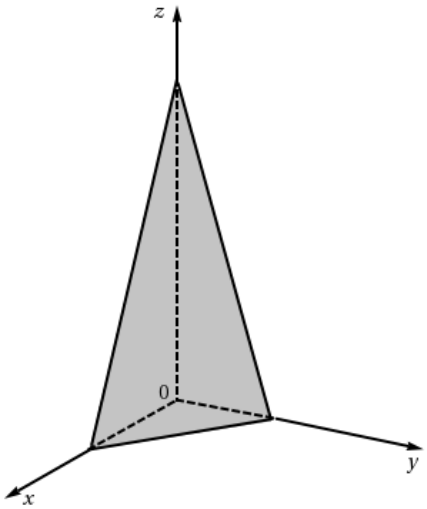


Sketch a graph of the function and compare it to the contour map.









16. –/1 points SCALCET8 14.1.067. My Notes Ask Your Teacher

Describe the level surfaces of the function.

$f(x, y, z) = x + 4y + 2z$

- The level surfaces are a family of parallel planes.
- The level surfaces are a family of ellipsoids.
- The level surfaces are a family of hyperboloids.
- The level surfaces are a family of hyperbolic cylinders.

17. –/1 points SCALCET8 14.1.068. My Notes Ask Your Teacher

Describe the level surfaces of the function.

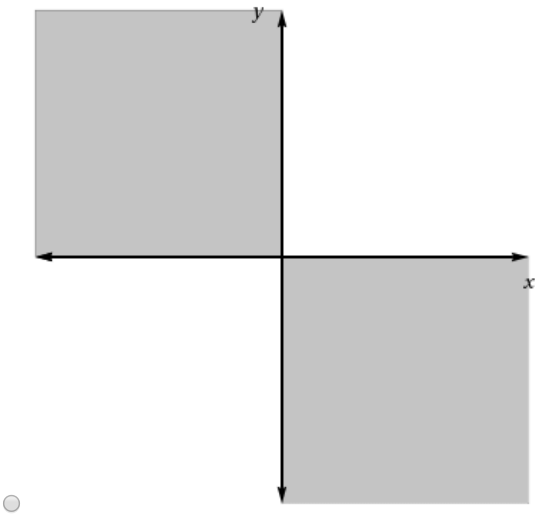
$f(x, y, z) = x^2 + 4y^2 + 5z^2$

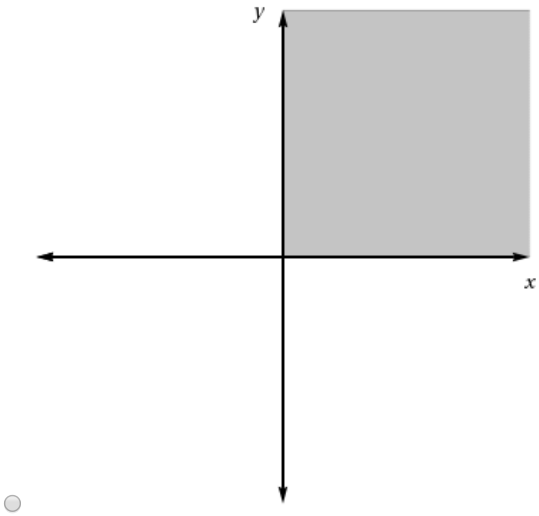
- The level surfaces are a family of parallel planes.
- The level surfaces are a family of ellipsoids.
- The level surfaces are a family of hyperboloids.
- The level surfaces are a family of hyperbolic cylinders.

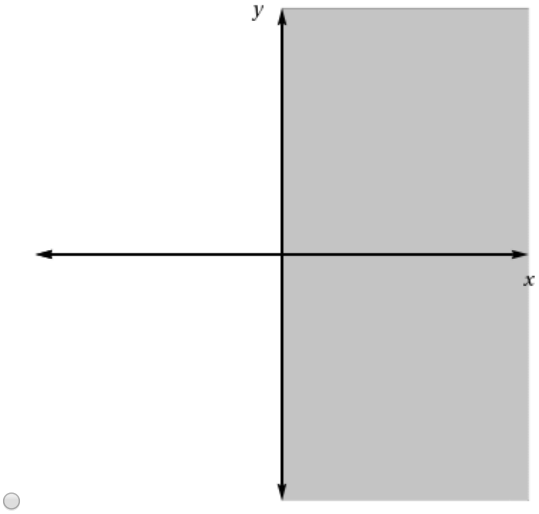
18. –/1 points SCALCET8 14.1.502.XP. My Notes Ask Your Teacher

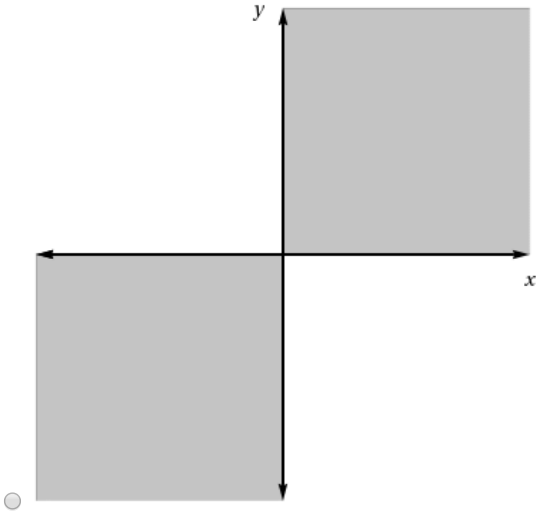
Find and sketch the domain of the function.

$f(x, y) = \sqrt{3xy}$





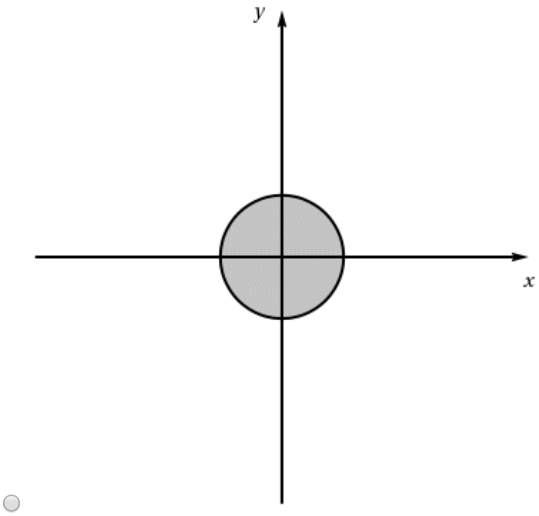


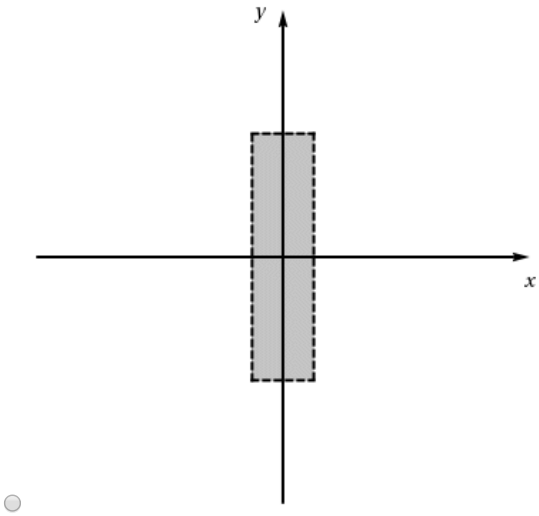


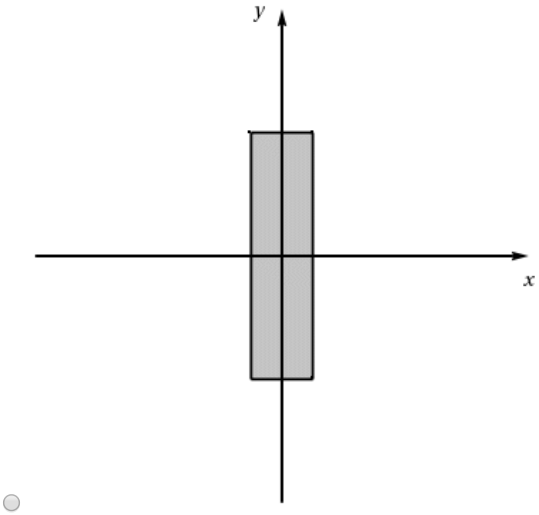
19. –/1 points SCALCET8 14.1.503.XP. My Notes Ask Your Teacher

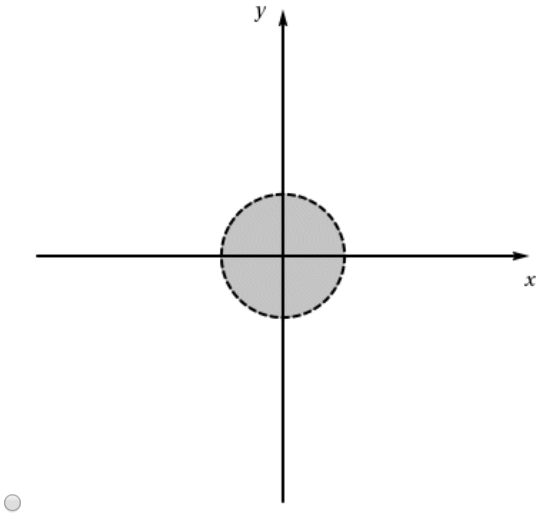
Find and sketch the domain of the function.

$f(x, y) = \sqrt{1 - x^2} - \sqrt{16 - y^2}$





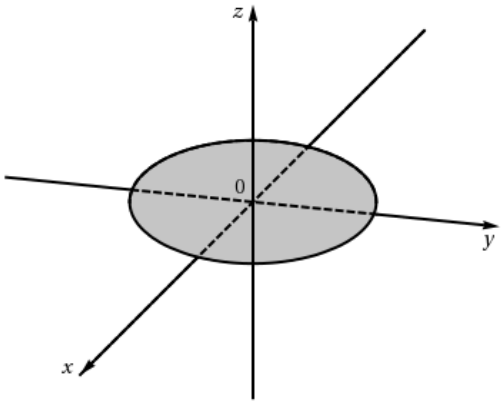


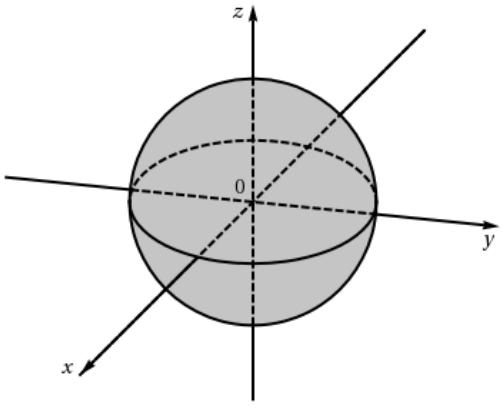


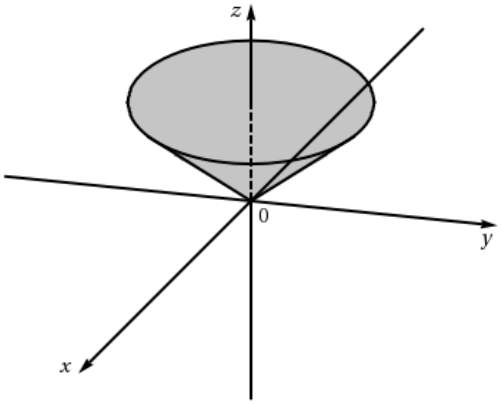
20. –/1 points SCALCET8 14.1.506.XP. My Notes Ask Your Teacher

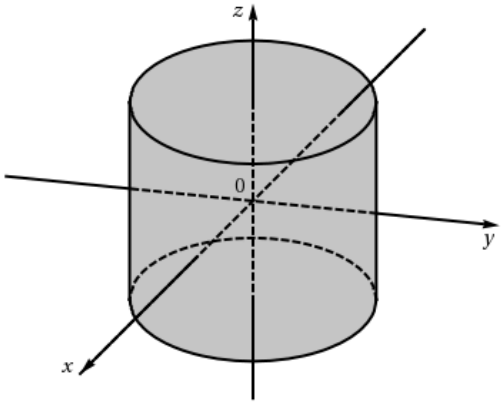
Find and sketch the domain of the function.

$f(x, y, z) = \sqrt{4 - x^2 - y^2 - z^2}$





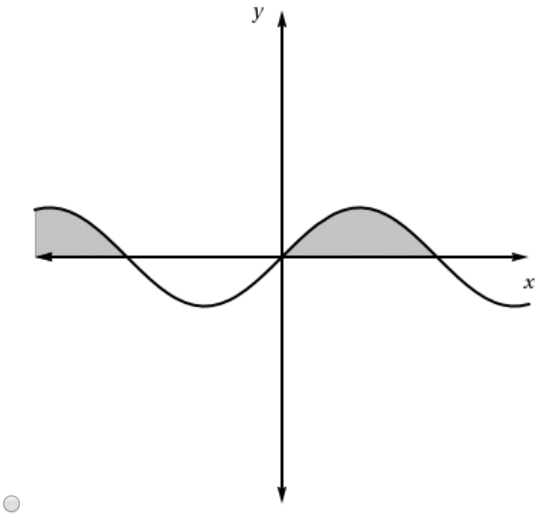


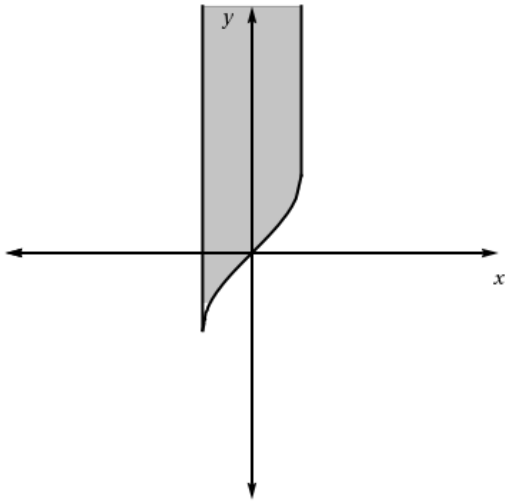


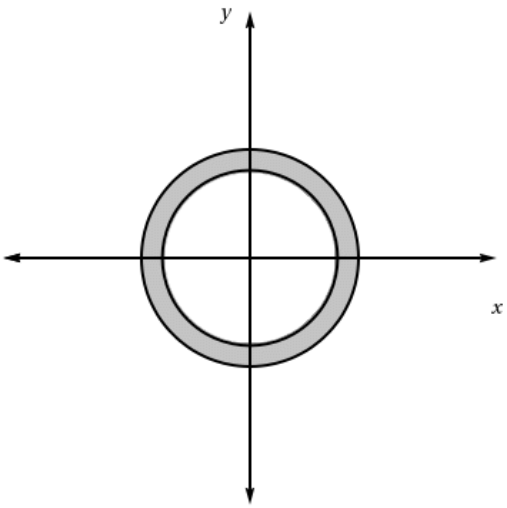
21. –/0 points SCALCET8 14.1.505.XP. My Notes Ask Your Teacher

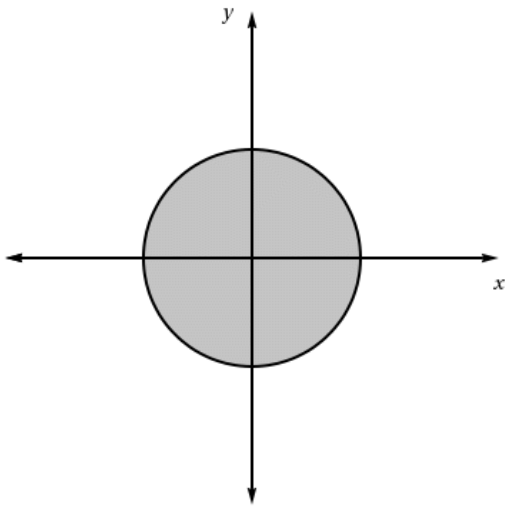
Find and sketch the domain of the function.

$f(x, y) = \arcsin(x^2 + y^2 - 4)$





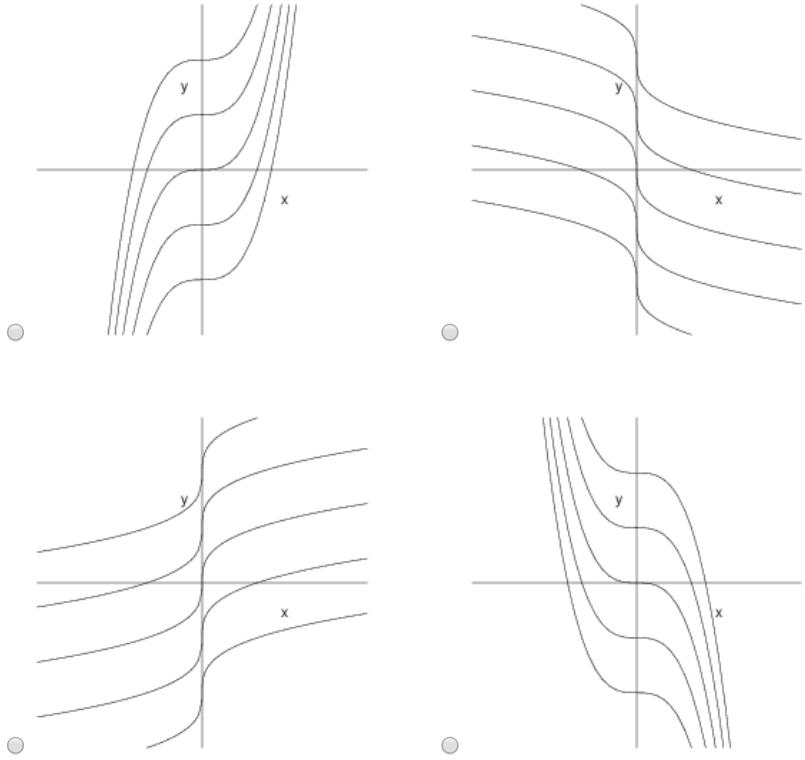




22. –/1 points SCALCET8 14.1.510.XP. My Notes Ask Your Teacher

Draw a contour map of the function showing several level curves.

$f(x, y) = x^3 - 4y$



23. –/1 points SCALCET8 14.1.513.XP. My Notes Ask Your Teacher

Consider the function below.

$f(x, y) = \ln(x + y - 3)$

(a) Evaluate $f(1, 3)$.

(b) Evaluate $f(e, 3)$.

(c) Find the domain of f.

- $x > 3$
- $y > 3$
- $x + y > 3$
- $x + y - 3 > 1$
- $x > 3, y > 3$

(d) Find the range of f. (Enter your answer using interval notation.)

24. –/1.5 points SCALCET8 14.1.514.XP. My Notes Ask Your Teacher

Consider the function below.

$f(x, y) = x^2e^{3xy}$

(a) Evaluate $f(6, 0)$.

(b) Find the domain of f.

- $(0, \infty) \times (0, \infty)$
- $\mathbb{R} \times (0, \infty)$
- $(0, \infty) \times \mathbb{R}$
- $(0, \infty) \times (1/3, \infty)$
- $\mathbb{R} \times \mathbb{R}$

(c) Find the range of f. (Enter your answer using interval notation.)

25. –/1 points SCALCET8 14.1.515.XP. My Notes Ask Your Teacher

Consider the function below.

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

(a) Find the domain of f.

- $y^2 \geq x$
- $x \geq y^2 - 5$
- $x + 5 \geq$
- $|x - y^2| \geq 0$
- $x \geq y^2$

(b) Find the range of f. (Enter your answer using interval notation.)

26. –/1.5 points SCALCET8 12.6.001. My Notes Ask Your Teacher

(a) What does the equation $y = x^2$ represent as a curve in $\mathbb{R}^2$?

- hyperbola
- circle
- parabola
- ellipse
- line

(b) What does it represent as a surface in $\mathbb{R}^3$?

- parabolic cylinder
- ellipsoid
- cone
- elliptic paraboloid
- hyperboloid

(c) What does the equation $z = y^2$ represent?

- cone
- ellipsoid
- elliptic paraboloid
- hyperboloid
- parabolic cylinder

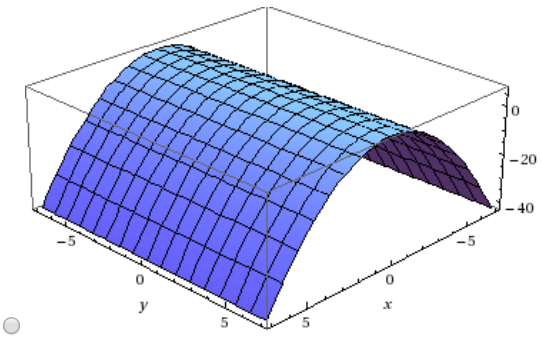
27. –/1 points **SCALCET8 12.6.003.** My Notes Ask Your Teacher

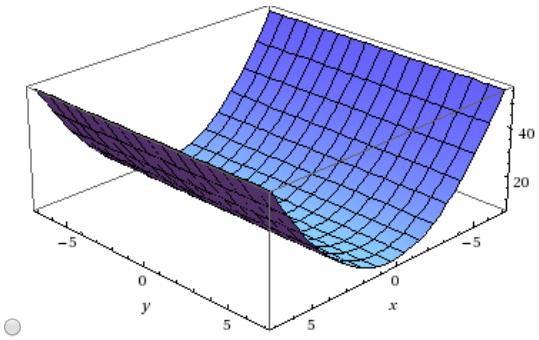
Describe the surface.

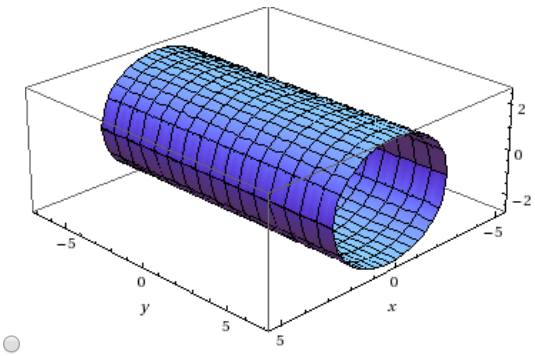
$x^2 + z^2 = 7$

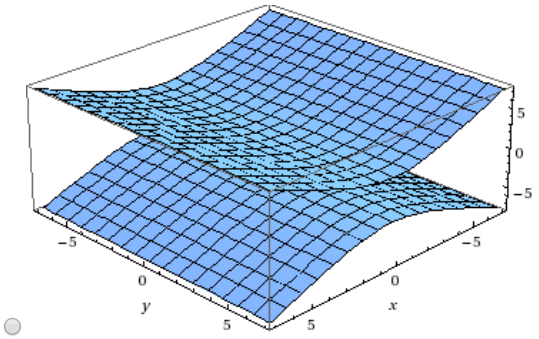
- sphere
- ellipsoid
- hyperboloid
- circular cylinder
- elliptic cylinder
- hyperbolic cylinder
- parabolic cylinder
- elliptic paraboloid

Sketch the surface.









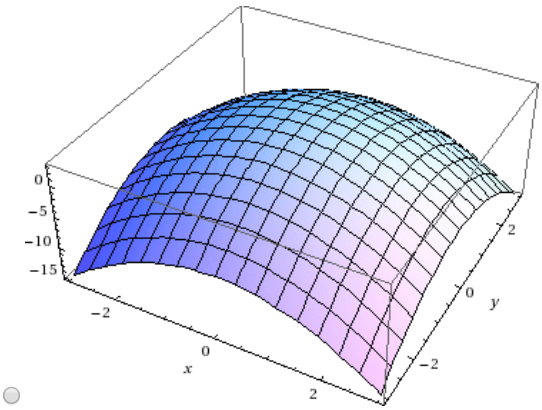
28. –/1 points **SCALCET8 12.6.005.** My Notes Ask Your Teacher

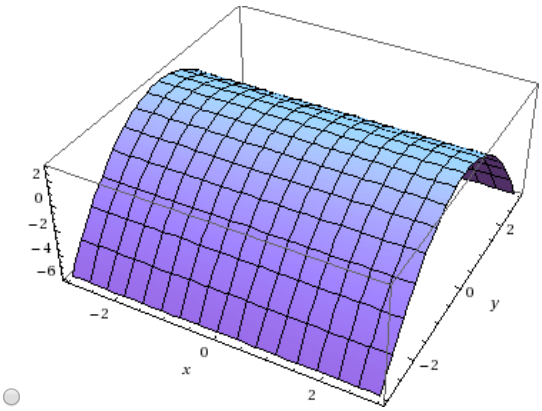
Describe the surface.

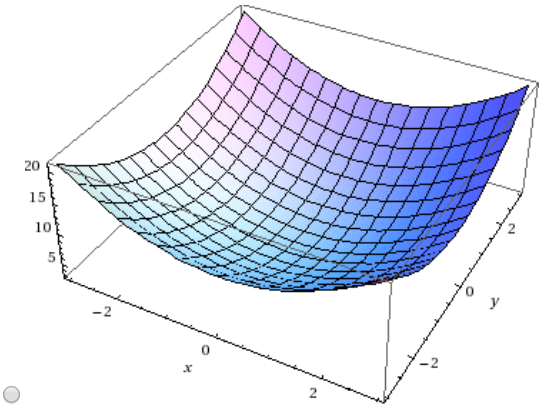
$z = 3 - y^2$

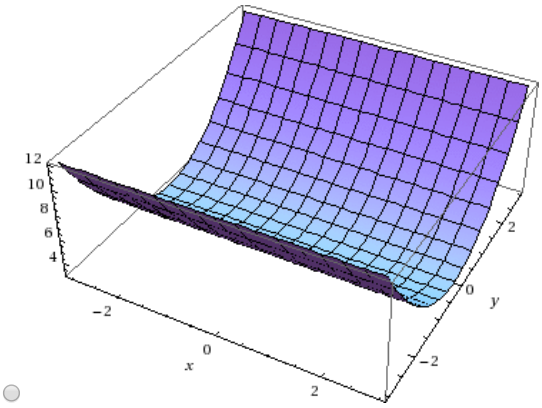
- cone
- ellipsoid
- hyperboloid
- elliptic cylinder
- hyperbolic cylinder
- parabolic cylinder
- elliptic paraboloid
- hyperbolic paraboloid

Sketch the surface.





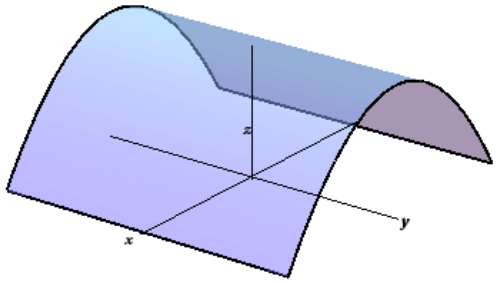


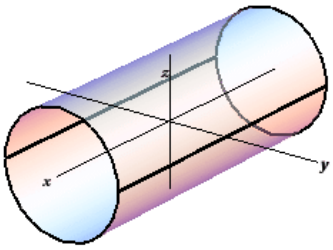


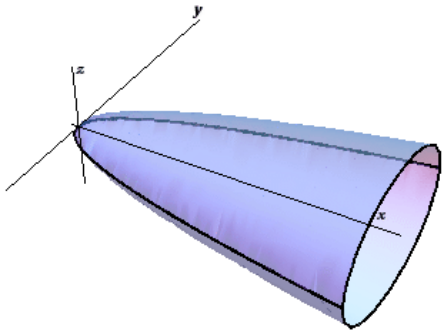
29. –/1 points SCALCET8 12.6.011. My Notes Ask Your Teacher

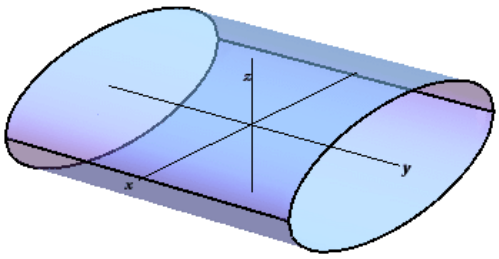
Use traces to sketch the surface.

$x = y^2 + 3z^2$









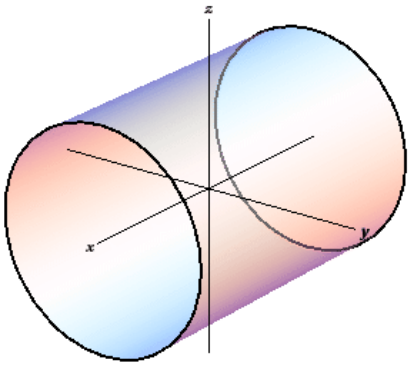
Identify the surface.

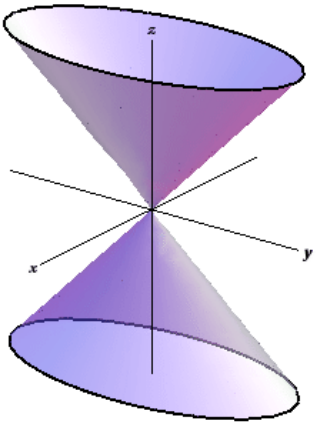
- elliptic cylinder
- parabolic cylinder
- elliptic cone
- hyperboloid of one sheet
- ellipsoid
- elliptic paraboloid
- hyperboloid of two sheets
- hyperbolic paraboloid

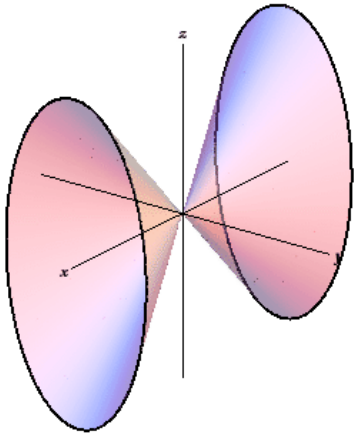
30. –/1 points SCALCET8 12.6.013. My Notes Ask Your Teacher

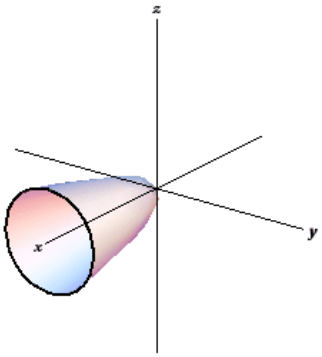
Use traces to sketch the surface.

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









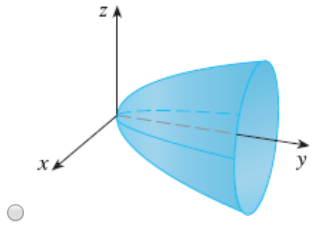
Identify the surface.

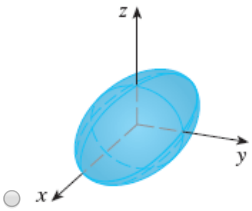
- hyperbolic paraboloid
- ellipsoid
- hyperboloid of two sheets
- parabolic cylinder
- elliptic cone
- elliptic cylinder
- hyperboloid of one sheet
- elliptic paraboloid

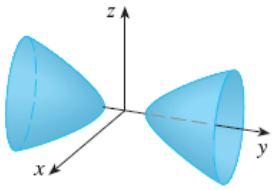
31. –/1 points SCALCET8 12.6.021. My Notes Ask Your Teacher

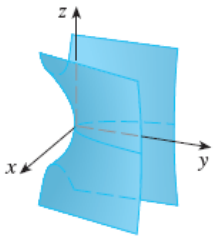
Match the equation with its graph.

$x^2 + 4y^2 + 9z^2 = 1$





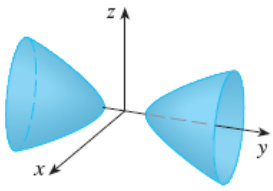


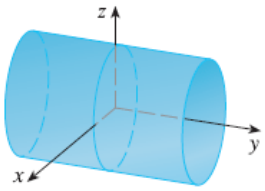


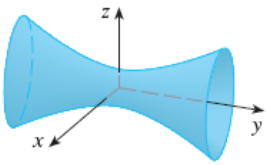
32. –/1 points SCALCET8 12.6.023. My Notes Ask Your Teacher

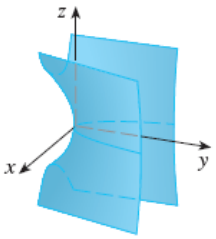
Match the equation with its graph.

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





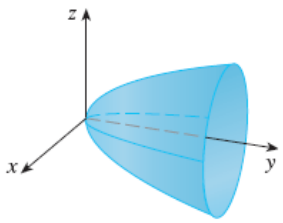


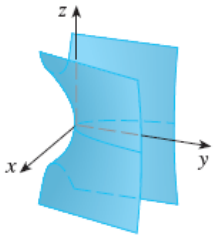


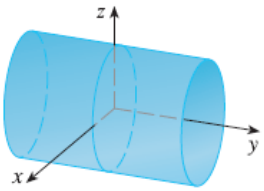
33. –/1 points SCALCET8 12.6.025. My Notes Ask Your Teacher

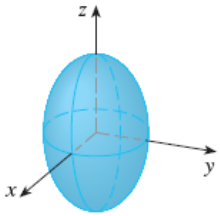
Match the equation with its graph.

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





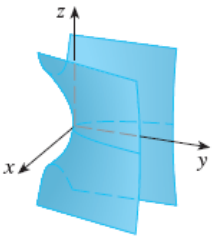


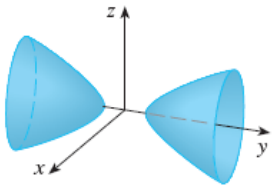


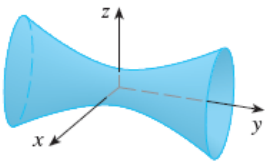
34. –/1 points SCALCET8 12.6.026. My Notes Ask Your Teacher

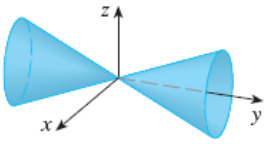
Match the equation with its graph.

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





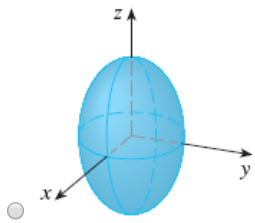


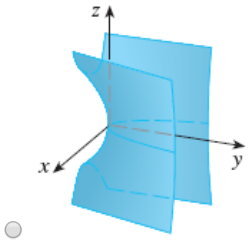


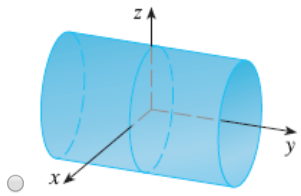
35. –/1 points SCALCET8 12.6.028. My Notes Ask Your Teacher

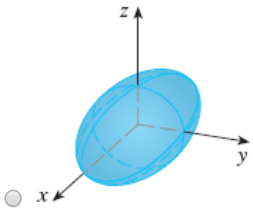
Match the equation with its graph.

$y = x^2 - z^2$









36. –/0 points SCALCET8 12.6.034. My Notes Ask Your Teacher

Consider the equation below.

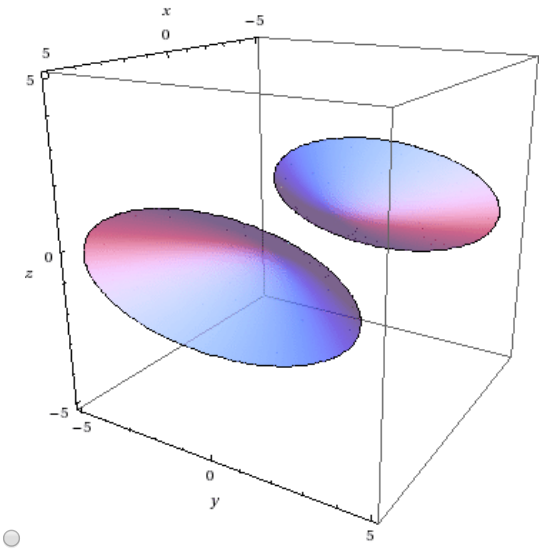
$y^2 = x^2 + 5z^2 + 5$

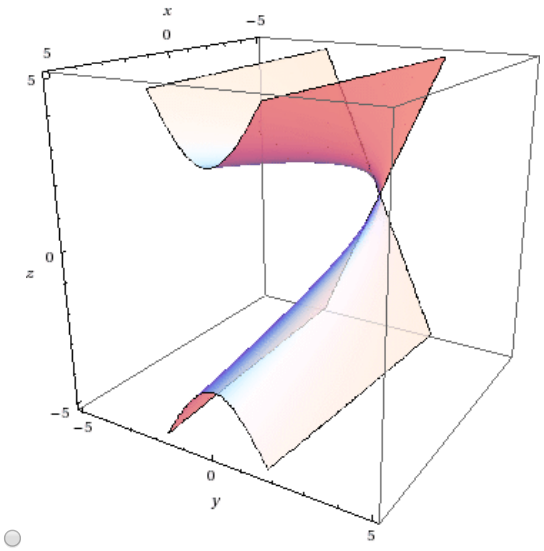
Reduce the equation to one of the standard forms.

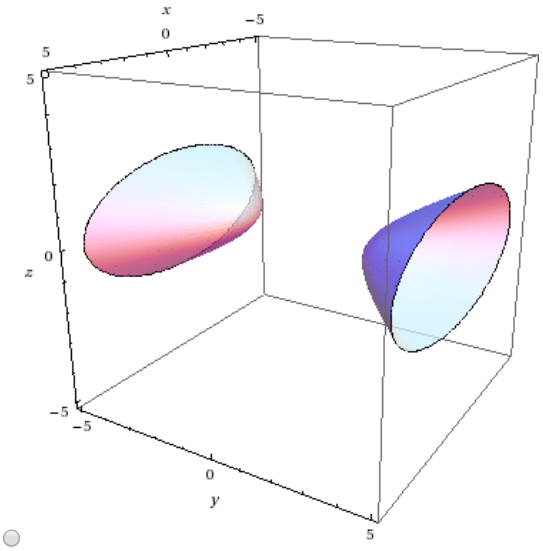
Classify the surface.

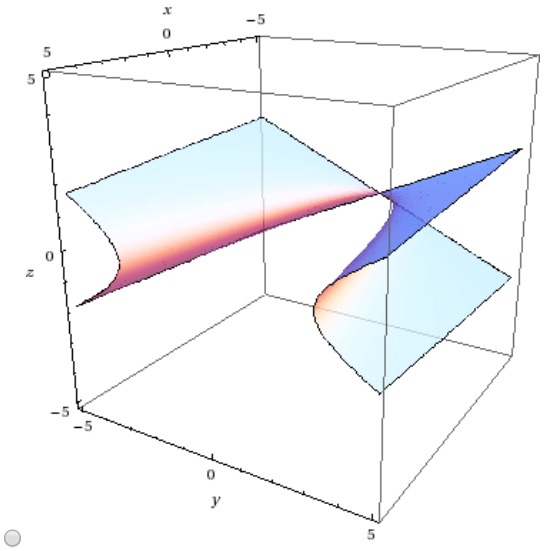
- ellipsoid
- elliptic paraboloid
- hyperbolic paraboloid
- cone
- hyperboloid of one sheet
- hyperboloid of two sheets

Sketch the surface.





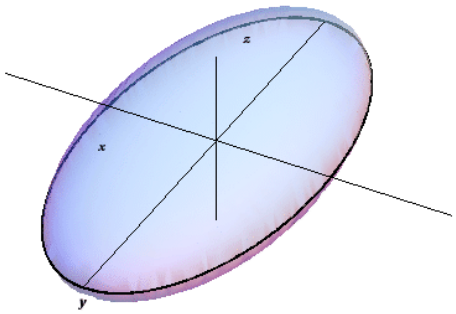


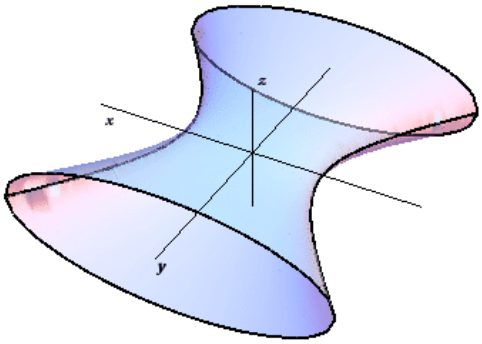


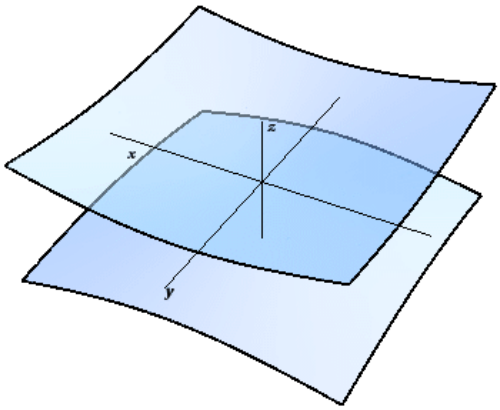
37. –/1.5 points SCALCET8 12.6.507.XP. My Notes Ask Your Teacher

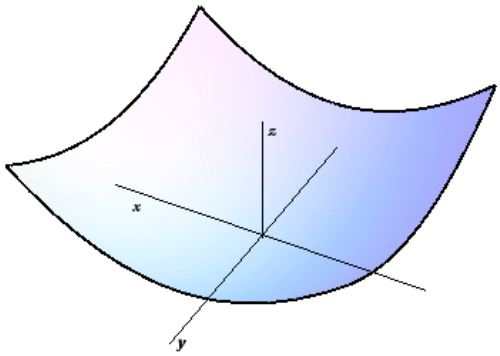
Use traces to sketch the surface.

$6x^2 - 24y^2 + z^2 = 24$









Identify the surface.

- ellipsoid
- elliptic paraboloid
- hyperboloid of two sheets
- hyperbolic paraboloid
- elliptic cylinder
- elliptic cone
- hyperboloid of one sheet
- parabolic cylinder

38. –/1 points SCALCET8 12.6.508.XP. My Notes Ask Your Teacher

Consider the equation below.

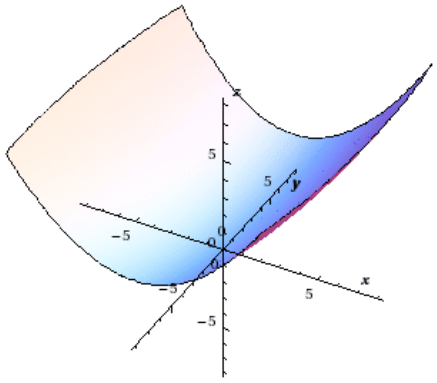
$$9x^2 + y^2 + 9z^2 - 6y - 72z + 144 = 0$$

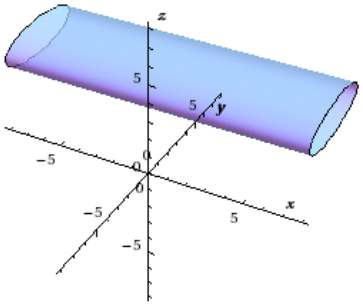
Reduce the equation to one of the standard forms.

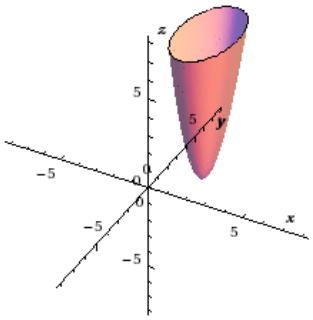
Classify the surface.

- parabolic cylinder
- circular cone
- elliptic cylinder
- ellipsoid
- hyperboloid of two sheets
- hyperbolic paraboloid
- hyperboloid of one sheet
- elliptic paraboloid

Sketch the surface.



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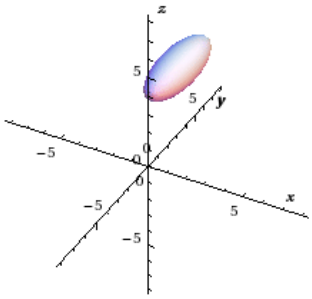
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39. –/0 points SCALCET8 12.6.509.XP. My Notes Ask Your Teacher

Consider the equation below.

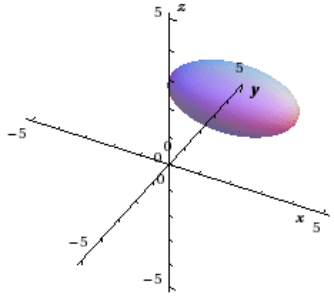
$$3y^2 + z^2 - x - 12y - 4z + 16 = 0$$

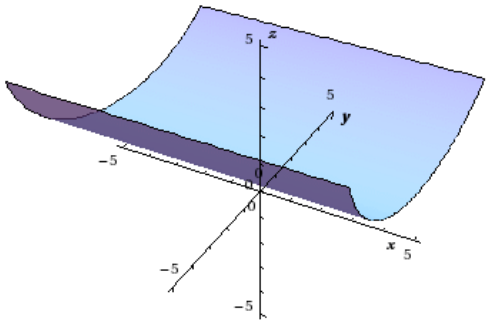
Reduce the equation to one of the standard forms.

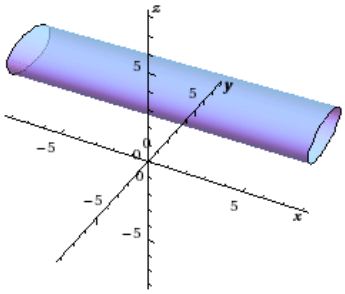
Classify the surface.

- ellipsoid
- elliptic paraboloid
- circular cone
- hyperboloid of two sheets
- hyperbolic paraboloid
- hyperboloid of one sheet
- parabolic cylinder
- elliptic cylinder

Sketch the surface.



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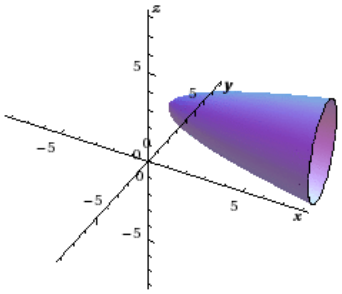
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40. –/1.5 points SCALCET8 12.6.AE.005. My Notes Ask Your Teacher

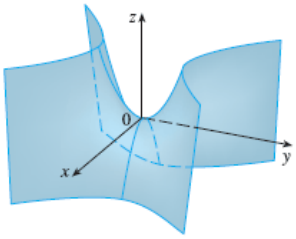


Figure 1

Video Example

EXAMPLE 5 Sketch the surface $z = 5y^2 - 6x^2$.

SOLUTION The traces in the vertical planes $x = k$ are the parabolas

$z =$ [ ] [ ], which open upward. The traces in $y = k$ are the parabolas

$z =$ [ ] [ ], which open downward. The horizontal traces are

$= k,$ [ ] [ ] a family of hyperbolas. We draw the family of traces in Figure 2, and we show how the traces appear when placed in their correct planes in Figure 3. In Figure 1 we fit together the terms to form the surface $z = 5y^2 - 6x^2$, a **hyperbolic paraboloid**. Notice that the shape of the surface near the origin resembles that of a saddle. This surface will be investigated further in a later section when we discuss saddle points.

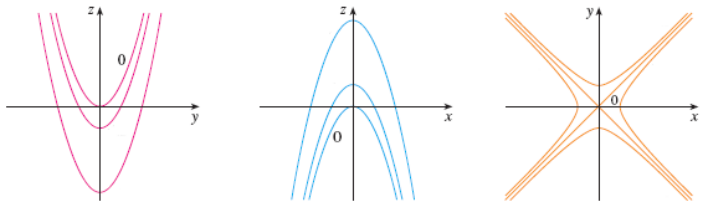


Figure 2

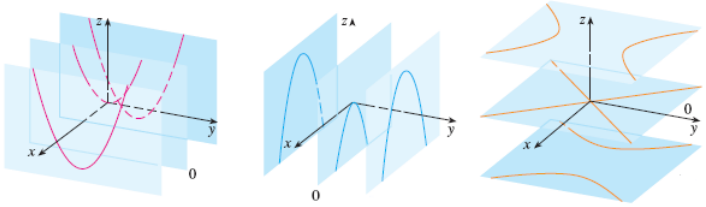
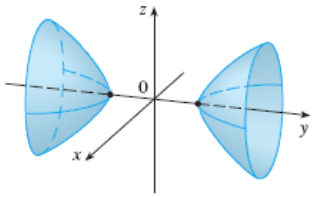


Figure 3

41. –/1.5 points SCALCET8 12.6.AE.007. My Notes Ask Your Teacher



Video Example

EXAMPLE 7 Identify and sketch the surface $4x^2 - y^2 + 2z^2 + 4 = 0$.

SOLUTION Dividing by -4, we first put the equation into standard form:

$$-x^2 + \frac{y^2}{\square} - \frac{z^2}{\square} = 1.$$

Comparing this equation with equations of quadratic surfaces, we see that it represents a ---Select--- , the only difference being that in this case the axis of the hyperboloid is the ---Select--- . The traces in the xy and yz-planes are the hyperbolas

$$-x^2 + \frac{y^2}{\square} = 1 \quad z = 0$$

and

$$\frac{y^2}{\square} - \frac{z^2}{2} = 1 \quad x = 0.$$

The surface has no trace in the xz-plane, but traces in the vertical planes $y = k$ for $|k| > 2$ are the ellipses

$$x^2 + \frac{z^2}{2} = \frac{\square}{\square} \quad y = k$$

which can be written as

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

Thus the traces are used to make the sketch in the figure.

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