

1) Determine whether  $z$  is a function of  $x$  and  $y$ .

a)  $x^2z + 3y^2 - xy = 10$   Yes

b)  $\frac{x^2}{4} + \frac{y^2}{9} + z^2 = 1$   No

2) Given  $g(x, y) = \ln|x + y|$ , find and simplify the functions values.

a)  $(1, 0)$

c)  $(0, e)$

e)  $(e, e/2)$

b)  $(0, -1)$

d)  $(1, 1)$

f)  $(2, 5)$

a)  0

c)  1

e)   $1 + \ln 3 - \ln 2$

b)  0

d)   $\ln 2$

f)   $\ln 7$

3) Given  $f(x, y, z) = \sqrt{x + y + z}$ , find and simplify the functions values.

a)  $(0, 5, 4)$

b)  $(6, 8, -3)$

a)  3

b)   $\sqrt{11}$

4) Given  $g(x, y) = \int_x^y (2t - 3) dt$ , find and simplify the functions values.

a)  $(4, 0)$

b)  $(4, 1)$

a)  -4

b)  -6

5) Given  $f(x, y) = 2x + y^2$ , find and simplify the functions values.

a)  $\frac{f(x + \Delta x, y) - f(x, y)}{\Delta x}$

b)  $\frac{f(x, y + \Delta y) - f(x, y)}{\Delta y}$

a)  $\boxed{2}$

b)  $\boxed{2y + \Delta y}$

6) Describe the domain and range of the function.

a)  $f(x, y) = x^2 + y^2$   $D = \{(x, y) \mid x \in \mathbb{R}, y \in \mathbb{R}\}, R = \{z \mid z \geq 0\}$

b)  $f(x, y) = e^{xy}$   $D = \{(x, y) \mid xy\text{-plane}\}, R = \{z \mid z > 0\}$

c)  $g(x, y) = \frac{y}{\sqrt{x}}$   $D = \{(x, y) \mid x > 0, y \in \mathbb{R}\}, R = \{z \mid z \in \mathbb{R}\}$

d)  $z = \frac{xy}{x - y}$   $D = \{(x, y) \mid x \neq y\}, R = \{z \mid z \in \mathbb{R}\}$

e)  $f(x, y) = \sqrt{4 - x^2 - y^2}$   $D = \{(x, y) \mid x^2 + y^2 \leq 4\}, R = \{z \mid 0 \leq z \leq 2\}$

f)  $f(x, y) = \ln(4 - x - y)$   $D = \{(x, y) \mid y < -x + 4\}, R = \{z \mid z \in \mathbb{R}\}$

7) Find the domain of the function.

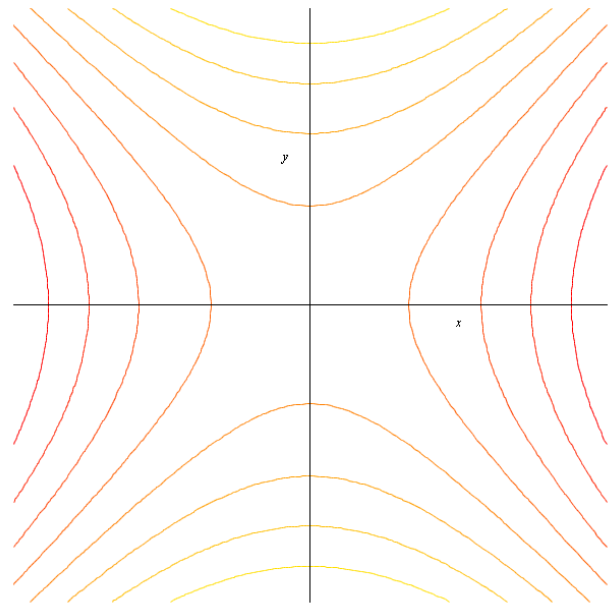
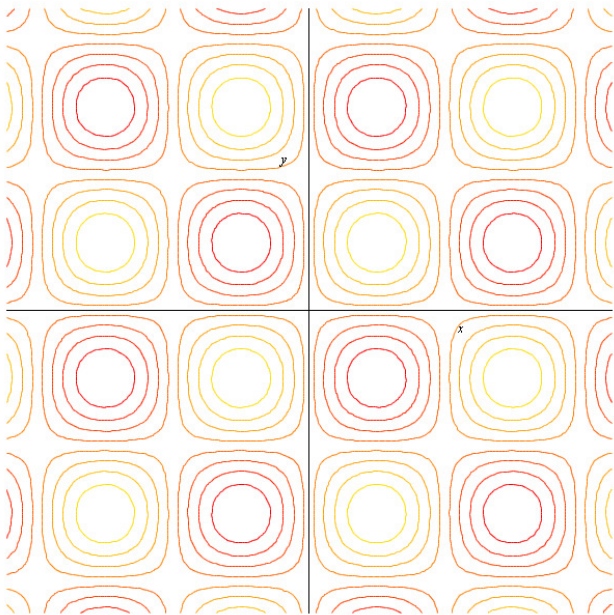
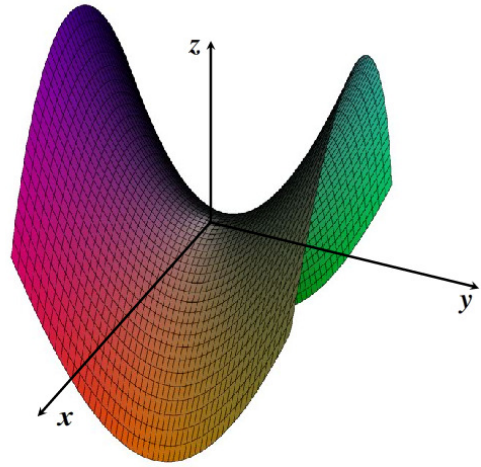
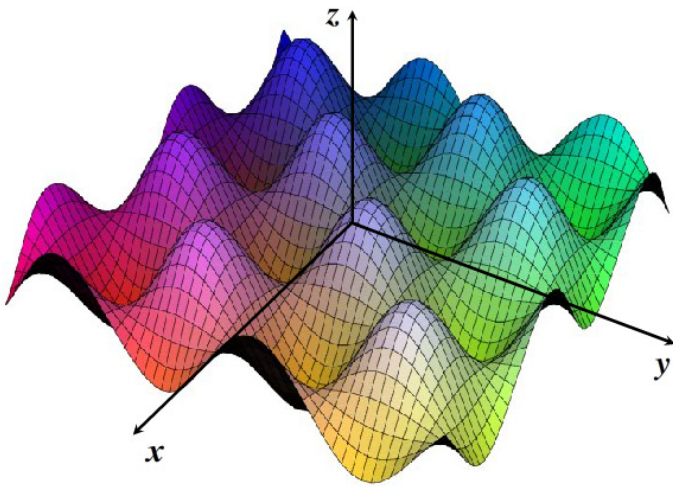
a)  $f(x, y, z) = \sqrt{1 - x^2 - y^2 - z^2}$

b)  $f(x, y, z) = \ln(16 - 4x^2 - 4y^2 - z^2)$

a)  $D = \{(x, y, z) \mid x^2 + y^2 + z^2 \leq 1\}$

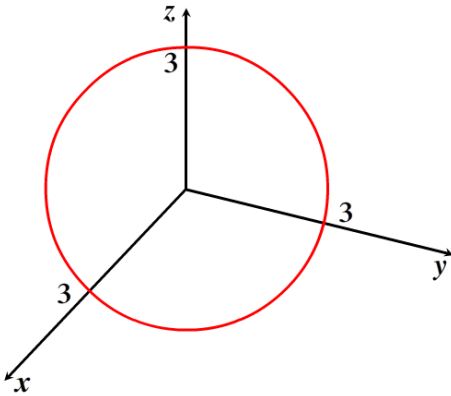
b)  $D = \left\{ (x, y, z) \mid \frac{x^2}{4} + \frac{y^2}{4} + \frac{z^2}{16} < 1 \right\}$

8) Make a rough sketch of a contour map for the functions whose graph are shown.

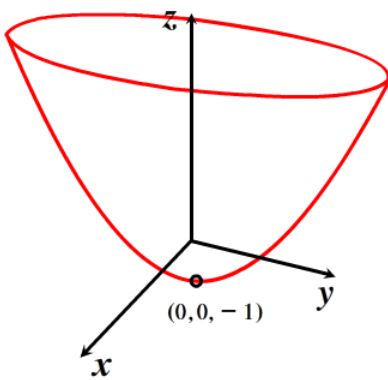


9) Sketch the level surface of the function for the given value of  $k$ . Also, classify the surface for each given  $k$ -value.

a)  $f(x, y, z) = x^2 + y^2 + z^2, k = 9$  Sphere



b)  $f(x, y, z) = x^2 + \frac{1}{4}y^2 - z, k = 1$  Elliptic paraboloid



c)  $f(x, y, z) = 4x^2 + 4y^2 - z^2, k = 0$  Elliptic cone

