

## V – Functions of Several Variables

1. Find and sketch the domain of each function.

a)  $f(x, y) = \sqrt{x+y}$

b)  $f(x, y) = \ln(9 - x^2 - 9y^2)$

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

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

2. Sketch the graph of the function (by finding appropriate traces and intercepts).

a)  $f(x, y) = 2x - 3y + 6$

b)  $f(x, y) = 1 - x^2$

c)  $f(x, y) = \sqrt{1+x^2+y^2}$

d)  $f(x, y) = 9 - x^2 - y^2$

3. Match the function with its graph. Give reasons for your choices.

a)  $f(x, y) = |x| + |y|$

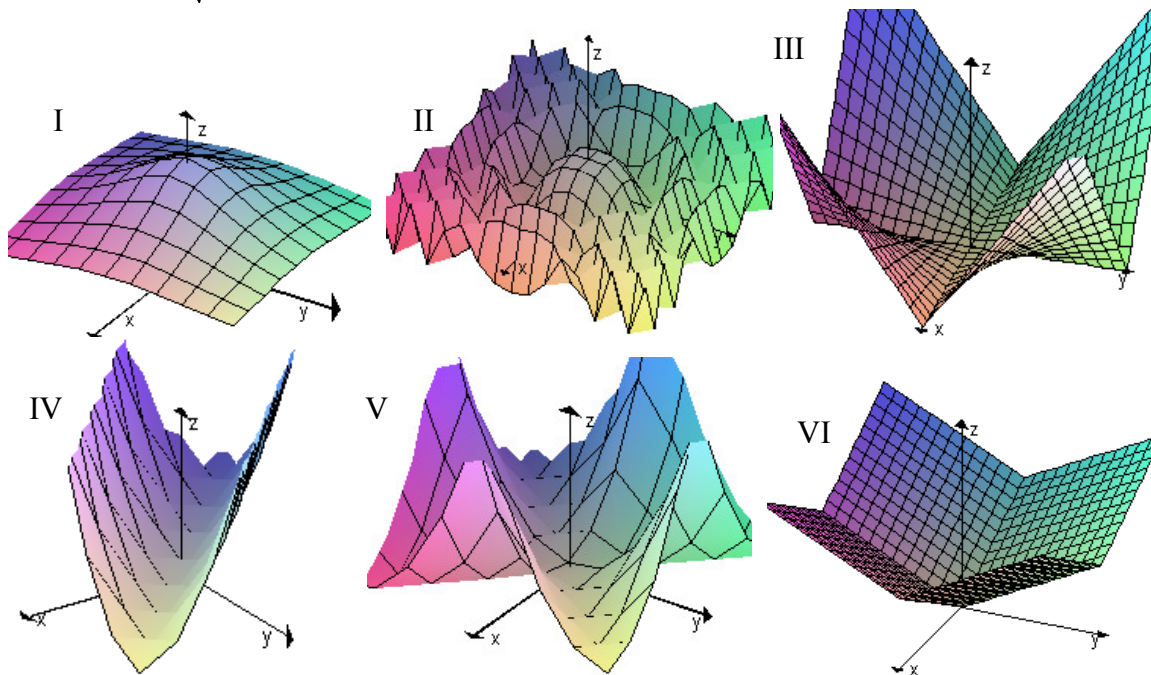
b)  $f(x, y) = |xy|$

c)  $f(x, y) = \cos\sqrt{x^2 + y^2}$

d)  $f(x, y) = \frac{1}{\sqrt{1+x^2+y^2}}$

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

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



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

a)  $f(x, y) = xy$

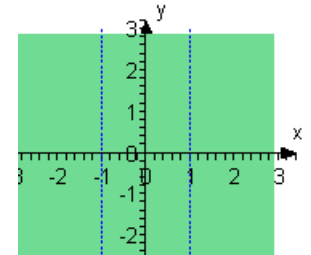
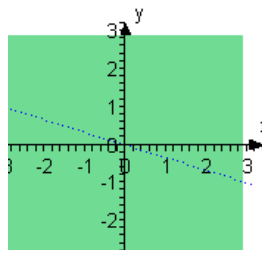
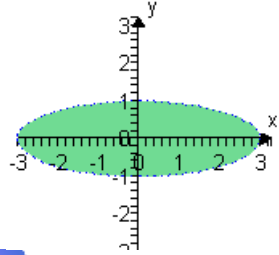
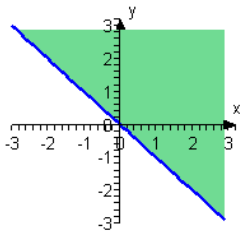
b)  $f(x, y) = \sqrt{25 - x^2 - y^2}$

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

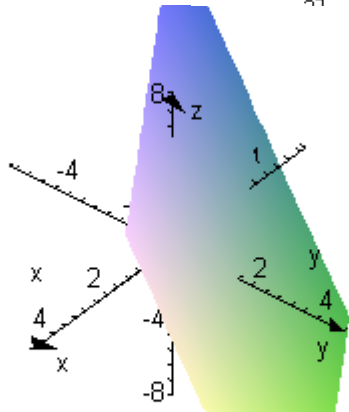
d)  $f(x, y) = \sqrt{x+y}$

**ANSWERS**

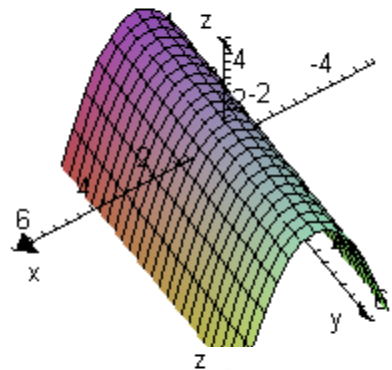
1. a)  $\{(x, y) | x \geq -y\}$     b)  $\{(x, y) | \frac{x^2}{9} + y^2 < 1\}$     c)  $\{(x, y) | y \neq \frac{1}{3}x\}$     d)  $\{(x, y) | x \neq \pm 1\}$



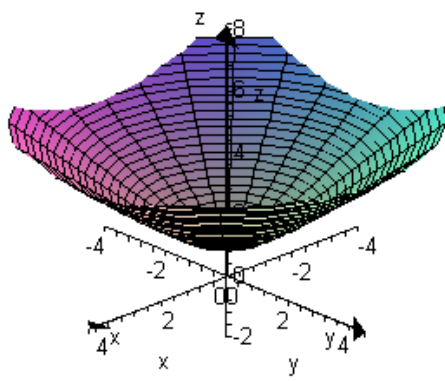
2. a)



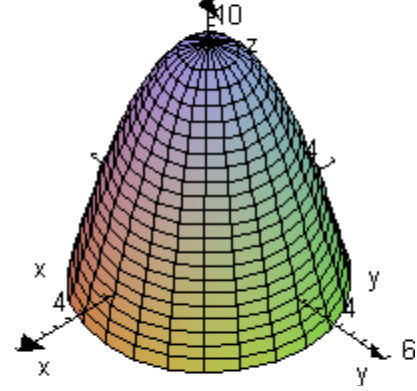
- b)



- c)



- d)



3. a) VI    b) III    c) II    d) I    e) IV    f) V

4. a)    b)    c)    d)

