

KEY

Math 225: Quiz the Fourth
February 28, 2014

You have the remainder of the period to complete this quiz. You may use a calculator for arithmetic and calculation only (i.e., no graphing!)

1. Let $f(x, y) = \sqrt{\frac{y}{x}}$

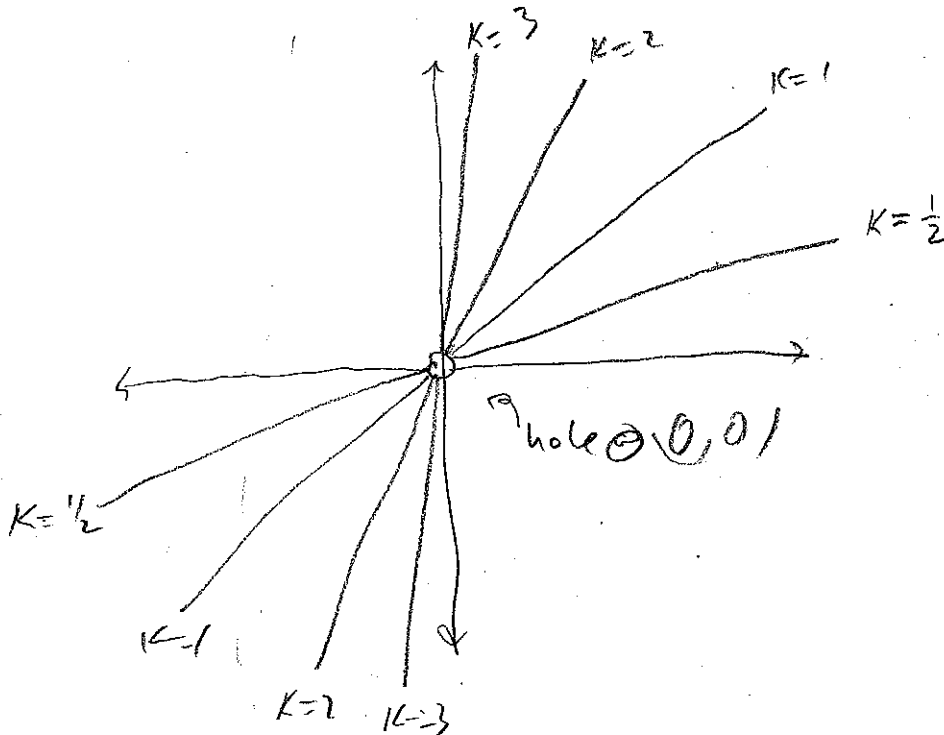
(a) What is the domain of f ?

$x \neq 0$ $\frac{y}{x} \geq 0 \Rightarrow$ $x > 0, y \geq 0$
or
 $x < 0, y \leq 0$

(b) What is the range of f (that is, what are the actual outputs of f)?

Range $f \geq 0$ (positive square root)

(c) Draw at least four level curves of f . Be sure to label your level curves.



2. Calculate the following limits

(a)

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

along $x=0$ $\lim_{y \rightarrow 0} \frac{-y^2}{y^2} = -1$

along $y=0$ $\lim_{x \rightarrow 0} \frac{x^2}{x^2} = 1$

Do not match
lim DNE

(b)

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 + y^2}{\sqrt{3x^2 + 3y^2 + 4} - 2}$$

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 + y^2}{\sqrt{3x^2 + 3y^2 + 4} - 2} = \lim_{(x,y) \rightarrow (0,0)} \frac{(x^2 + y^2)(\sqrt{3x^2 + 3y^2 + 4} + 2)}{3x^2 + 3y^2 + 4 - 4}$$

$$= \lim_{(x,y) \rightarrow (0,0)} \frac{\sqrt{3x^2 + 3y^2 + 4} + 2}{3} = \frac{4}{3}$$

3. Calculate the partial derivatives f_x and f_y if $f(x, y) = x^3 - x^2y + xy^2 - y^3$

$$f_x = 3x^2 - 2xy + y^2 - 0$$

$$f_y = 0 - x^2 + 2xy - 3y^2$$

4. A classmate tells you that he's calculated the partial derivatives of a 'well-behaved' function $f(x, y)$ as $f_x = 4x + 2y$ and $f_y = 3x + 6y$. Do you believe him? Why or why not?

$$f_x = 4x + 2y$$

$$f_y = 3x + 6y$$

$$f_{xy} = 2$$

$$f_{yx} = 3$$

∴

No, he is mistaken.