

Math 173 - Quiz 5

March 9, 2017

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Let $f(x, y) = \sqrt{36 - x^2 - 3y^2}$. Determine the domain of f . Is the domain open, closed, or neither? Describe the graph of f .

$$36 - x^2 - 3y^2 \geq 0$$

$$\Rightarrow x^2 + 3y^2 \leq 36$$

DOMAIN = $\{(x, y) : x^2 + 3y^2 \leq 36\}$ ← THIS IS A CLOSED SET.

THE GRAPH IS THE UPPER ($z \geq 0$)
HALF OF THE ELLIPSOID
 $x^2 + 3y^2 + z^2 = 36$.

2. (3 points) Find the limit or show that it does not exist:

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

$$y = 0 : \lim_{x \rightarrow 0} \frac{x}{x^3} = \lim_{x \rightarrow 0} \frac{1}{x^2} = +\infty$$

$$x = 0 : \lim_{y \rightarrow 0} \frac{y^4}{y^4} = 1$$

LIMIT DNE

3. (3 points) Find the limit or show that it does not exist:

$$\lim_{(x,y) \rightarrow (1,3)} \frac{xy - 3x}{x^2y - 3x^2 + y^2 - 6y + 9}$$

$$\lim_{(x,y) \rightarrow (1,3)} \frac{x(y-3)}{x^2(y-3) + (y-3)^2} = \lim_{(x,y) \rightarrow (1,3)} \frac{x}{x^2 + y - 3} = 1$$

4. (1 points) Determine where $g(x, y, z) = \frac{\sqrt{x+y} - \sqrt{x-y}}{z}$ is continuous.

CONTINUOUS WHEREVER DEFINED ...

$$x + y \geq 0 \quad x - y \geq 0 \quad z \neq 0$$

$$y \geq -x \quad y \leq x$$