

Math 173 - Quiz 4

February 28, 2013

Name key

Score _____

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

1. (3 points) Find the limit: $\lim_{(x,y) \rightarrow (4,3)} \frac{\sqrt{x} - \sqrt{y+1}}{x-y-1}$ $\circ/\circ \rightarrow \text{MORE WORK}$

$$\begin{aligned} \lim_{(x,y) \rightarrow (4,3)} \frac{\sqrt{x} - \sqrt{y+1}}{x-y-1} \cdot \frac{\sqrt{x} + \sqrt{y+1}}{\sqrt{x} + \sqrt{y+1}} &= \lim_{(x,y) \rightarrow (4,3)} \frac{(x-y-1)}{(x-y-1)(\sqrt{x} + \sqrt{y+1})} \\ &= \lim_{(x,y) \rightarrow (4,3)} \frac{1}{\sqrt{x} + \sqrt{y+1}} = \frac{1}{\sqrt{4} + \sqrt{4}} = \boxed{\frac{1}{4}} \end{aligned}$$

2. (3 points) Show that the limit does not exist: $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2y}{x^4 + y^2}$

Along $x=0$: $\lim_{y \rightarrow 0} \frac{0}{y^2} = \lim_{y \rightarrow 0} 0 = 0$

Along $y=x^2$: $\lim_{x \rightarrow 0} \frac{x^4}{2x^4} = \lim_{x \rightarrow 0} \frac{1}{2} = \frac{1}{2}$

} LIMIT DNE

3. (4 points) Identify level curves in the planes parallel to the coordinate planes. Then sketch the graph.

$x=k$:

$$\underbrace{\frac{y^2}{4} + \frac{z^2}{9}}_{\text{ELLIPSES CENTERED AT } (y,z) = (0,0)} = 1 + \frac{k^2}{9}$$

THESE EXIST FOR ALL K.

$y=k$:

$$\underbrace{\frac{z^2}{9} - \frac{x^2}{4}}_{\text{HYPERBOLAS}} = 1 - \frac{k^2}{4}$$

HYPERBOLAS

$$\frac{y^2}{4} + z^2 - \frac{x^2}{9} = 1$$

$z=k$:

$$\underbrace{\frac{y^2}{4} - \frac{x^2}{9}}_{\text{HYPERBOLAS}} = 1 - k^2$$

HYPERBOLOID OF

ONE SHEET

