

Name _____

KEY

Math 254, Quiz #4, Summer 2012

Instructions: Show all work. Use exact answers unless the problem specifically asks you to approximate or begins with decimal values.

- 1. Sketch at least five level curves for the function $z = x^2 - y^2 + 2$. [Hint: solve for y , and choose values for z .]

$$f(x, y) = z$$

$$z = x^2 - y^2 + 2$$

$$y^2 = x^2 - z + 2$$

$$y = \pm \sqrt{x^2 - z + 2}$$

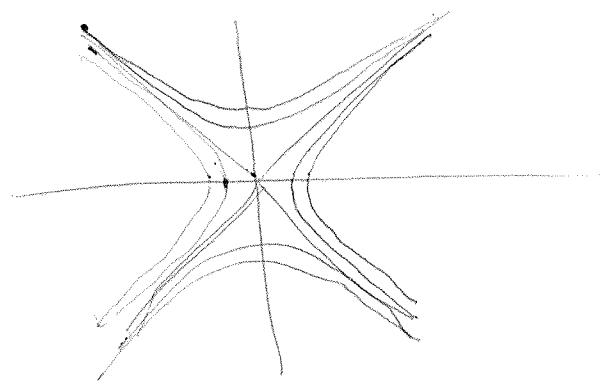
$$z=3 \quad y = \pm \sqrt{x^2 - 1}$$

$$z=4 \quad y = \pm \sqrt{x^2 - 2}$$

$$z=0 \quad y = \pm \sqrt{x^2 + 2}$$

$$z=1 \quad y = \pm \sqrt{x^2 + 1}$$

$$z=2 \quad y = \pm |x|$$



- 2. Find the limits.

a. $\lim_{(x,y) \rightarrow (0,1)} \frac{\arccos\left(\frac{x}{y}\right)}{1+xy}$

$$\frac{\frac{\pi}{2}}{1} = \boxed{\frac{\pi}{2}}$$

b. $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 y}{x^3 + y^2}$

$$\lambda = 0 \quad \lim_{y \rightarrow 0} \frac{0}{y^2} = 0$$

$$x^3 = y^2 \quad \lim_{x \rightarrow 0} \frac{x^2 x^{3/2}}{x^3 + x^3} = \frac{x^{7/2}}{2x^3} = \frac{1}{2} x^{1/2} = 0$$

$$y = x \quad \lim_{x \rightarrow 0} \frac{x^2 \cdot x}{x^3 + x^2} = \frac{x^3}{x^2(x+1)} = \frac{x}{x+1} = 1$$

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 y}{x^3 + y^2} = \boxed{\text{DNE}}$$