

Quiz #1

Math 1100-05, Fall 2005

(5 points) **Problem 1.** (a) Decide whether the equation

$$y^2 = x^2 - 1$$

defines y as a function of x .

$$y = \pm \sqrt{x^2 - 1} \quad \text{for } x^2 \geq 1 \text{ (or } |x| \geq 1)$$

y does not define a function of x .

(b) Find the inverse of the function $f(x) = \sqrt{x^2 - 1}$, $x \geq 1$.

Domain $[1, \infty)$

Range $[0, \infty)$

$$\sqrt{x^2 - 1} = y$$

$$x^2 - 1 = y^2$$

$$x^2 = y^2 + 1$$

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

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

$$y = \sqrt{x^2 - 1} \quad \text{Interchange } x \text{ and } y$$

$$\boxed{f^{-1}(x) = \sqrt{x^2 + 1} \quad x \geq 0}$$

(5 points) **Problem 2.** Find the limits:

$$(a) \lim_{x \rightarrow 2} \frac{\sqrt{x+1}}{x-1} = \frac{\sqrt{2+1}}{2-1} = \frac{\sqrt{3}}{1} = \textcircled{\sqrt{3}}$$

$$(b) \lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} = \frac{1^2 - 1}{1 - 1} = \frac{0}{0} \Rightarrow \text{we need to simplify}$$

$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} = \lim_{x \rightarrow 1} \frac{\cancel{(x-1)}(x+1)}{\cancel{x-1}} = \lim_{x \rightarrow 1} x + 1 = \textcircled{2}$$