Math 150 Quiz 2A Fall 2012

Name: _____ Section time: _____

NO CALCULATORS

1. [5 points] What is the formal definition of the limit

$$\lim_{x \to a} f(x) = L?$$

For every $\varepsilon > 0$ there exists a $\delta > 0$ such that if $0 < |x-a| < \delta$ then $|f(x)-L| < \varepsilon$.

2. [10 points] Using only the formal definition of a limit prove that

$$\lim_{x \to 2} 3x + 1 = 7.$$

Let $\varepsilon > 0$ be given. Pick $\delta = \frac{\varepsilon}{3}$.

Suppose $0 < |x-2| < \delta$. Then

$$|x-2| < \frac{\varepsilon}{3}$$

$$3|x-2| < \varepsilon$$

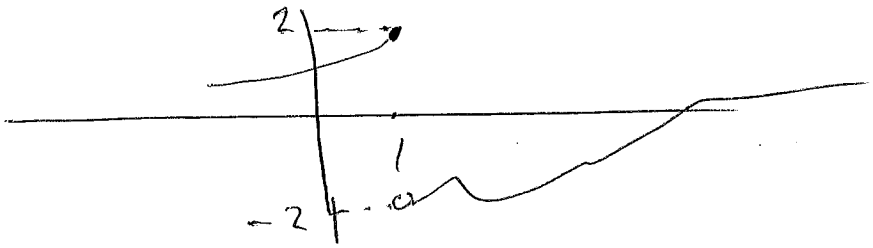
$$|3x-6| < \varepsilon$$

$$|(3x+1)-7| < \varepsilon.$$

Therefore $\lim_{x \to 2} 3x+1 = 7$.

3. [5 points] Sketch the graph of an example of a function f that satisfies the following conditions.

$\lim_{x\to 1^-} f(x) = 2$ $\lim_{x\to 1^+} f(x) = -2$ $f(1) = 2$



4. [10 points] Solve the equation below for x.

$$\ln(x+7) - \ln(x+2) = \ln 3$$

$\ln \frac{x+7}{x+2} = \ln 3$

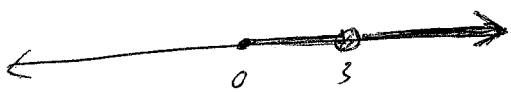
$\frac{x+7}{x+2} = 3$

$x+7 = 3x+6$

$1 = 2x$ $x = \frac{1}{2}$

5. [5 points] What is the domain of $\frac{\sqrt{x}}{x^2-9}$? Express your answer in interval notation and draw it on the real number line.

Because of the $\sqrt{x}$, $x \geq 0$. Because ~~for~~ x^2-9, $x \neq \pm 3$.

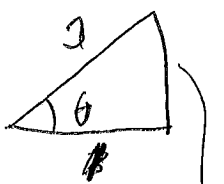


$(0,3) \cup (3,\infty)$

6. [5 points] Evaluate $\tan(\sec^{-1}(3))$.

Let $\theta = \sec^{-1}(3)$

So, $\sec\theta = 3$ or $\cos\theta = \frac{1}{3}$, see triangle.



$\sqrt{3^2-1^2} = \sqrt{8} = 2\sqrt{2}$ Hence $\tan\theta = \frac{2\sqrt{2}}{1}$.