Teaching Notes for Calculus
Homework #2

Teaching options: Lectures #2 is a VERY easy, if not the easiest, lecture and homework of the entire year. Lecture #3 is MUCH more difficult and VERY time consuming to both teach and to do the homework. If it is at all possible, and you have extra time during week 2, I would suggest beginning Lecture #3 so that you, and your students, don't have a meltdown during week 3.

Rules for Finding Limits

Rule #1: As long as the graph isn't undefined at the value x approaches, and the graph is a "normal" smooth graph without any breaks or jumps (not composite functions), then the limit of the function will just be the value obtained from substituting the value x approaches into the function.

Rule #2: All of the six trig functions obey this rule as long as you aren't trying to take the limit at a place where the trig function is undefined.

Rule #3: Special rules for limits of functions include that if you add or subtract or multiply or divide two functions then their respective limits follow similar math. This also applies to multiplying a function by a constant, taking a function to a power, radicalizing a function, or composite functions.

It is CRITICAL for the student to find ALL restrictions, either by demonstrating how they know and the work required to figure it out and/or by graphing the functions.

Classroom Examples

1) Find $\lim_{x\to 13}\sqrt{2x-1}$

Answer: L = 5

2) Find $\lim_{x\to -3}(3x+5)^2$

Answer: L = 16

3) Find $\lim_{x\to -2}\left(\frac{5}{-3x+6}\right)$

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Answer: $L = \frac{5}{12}$

4) Find $\lim_{x \to -4} \frac{x^2 + 4}{-2x}$

Answer: $L = \frac{5}{2}$

5) If $\lim_{x \to c} f(x) = \frac{-3}{8}$ and $\lim_{x \to c} g(x) = \frac{5}{6}$, find:

A. $\lim_{x \to c} [-6f(x)]$ B. $\lim_{x \to c} [g(x) - f(x)]$ C. $\lim_{x \to c} [f(x)g(x)]$

D. $\lim_{x \to c} \frac{g(x)}{f(x)}$

$L = \frac{9}{4}$ $L = \frac{29}{24}$ $L = \frac{-5}{16}$ $L = \frac{-9}{20}$

6) Find $\lim_{x \to -5} \frac{\sqrt{2x + 14}}{x - 5}$

Answer: The Limit Does Not Exist

7) Find $\lim_{x \to 7} \cot\left(\frac{\pi x}{6}\right)$

Answer: $L = \sqrt{3}$

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8) If $\lim_{x\to c} f(x) = 54$, find:

A. $\lim_{x\to c}[f(x)]^{-3}$ B. $\lim_{x\to c}\sqrt{f(x)}$ C. $\lim_{x\to c}[-2f(x)]$

D. $\lim_{x\to c}[f(x)]^{\frac{2}{3}}$

$L = \frac{1}{157464}$ $L = 3\sqrt{6}$ $L = -108$ $L = 9\sqrt[3]{4}$