Limits Outline

AB Calculus I -- Spring 1995

Dr. Hartzler

2.1 Calculator explorations

Fact: $\lim_{x \to 0} \frac{\sin x}{x} = 1$

Limits: left/right/both for functions (p. 49 25-30)
Pictorial/graph limits left/right/both (p. 49 31-40)
Piecewise (p. 49 41-46)

2.2 Definition of a limit of a function as $x \to a$

"Proof" (example 1, pp. 54-55). We identified these steps:

1. Task statement
2. ε-tolerance statement
3. Work to $| x - a | < g(\varepsilon)$ form
4. Choose appropriate $\delta \leq g(\varepsilon)$
5. Work $| x - a | < g(\varepsilon)$ forward to $0 < | f(x) - L | < \varepsilon$ form

2.3 Techniques for lim as $x \to a$

Basic Theorems
Basic substitution
Algebraic specials: factoring/reducing; addition, rationalization of numerator
Proof of "Limit of sum = sum of limits" (supply pieces or reasons only)
Triangle inequality
Sandwich theorem pp. 64-65 do Thursday 2/16

2.4 Limits involving ∞

Limits at ∞ ($\pm \infty$) as $x \to a$
Limits as $x \to \pm\infty$

2.5 Continuity

Definition of f(x) being continuous at *c* if three conditions are met:

1) f(c) is defined (not $\pm\infty$ or division by zero or $\sqrt{}$ of negatives, etc.)
2) lim f(x) exists as $x \to c$
3) lim f(x) = f(c) as $x \to c$

Theorem 2.21
Theorem 2.26 and do 55-58 Thursday 2/16