CSV Chapter 1.8, Limits.

Lesson Plan

A. Motivate lesson:
Limits are used for instantaneous rate of change (when going from average rate of change).

B. What we have seen so far:

1) Continuity (informal definition) and Intermediate Value Theorem

2) Asymptotes have been found analytically for rational functions.
- Horizontal asymptotes are equations, limits are numbers
- Vertical asymptotes have left hand and right hand limits of + or – infinity
- We also studied Holes

3) Limits were conjectured by filling out tables even when f(c) does not exist
- limit as x -> 0 for sin(2x)/x = 2.
- limit as x -> 3 for (x^2 – 9)/(x – 3) = 6

4) There was homework on Limits for today. It was challenging for many of you. You are allowed to re-do it for the next class.

C. Review:

* Review how to make a function continuous.

Textbook page 47: Question 17 from Homework due Monday
Find k so that the following piecewise function is continuous. f(x) = kx for 0<=x<2 or 3x^2 for x>=2. [Answer: k=6].

D. New material:

1) Go over the informal definition of limits
"We write lim(x->c) f(x) = L if the values of f(x) approach L as x approaches c," textbook page 48. I have been using the term "intended height."

2) Go over even number textbook questions, some of which were due today.

1.8, page 55, Question 2: given graph, find limits. Answers: 8, 6, 15, 4.

1.8, page 55, Question 4 from homework: Use a graph and ZOOM4 to find lim(theta->0) [cos(theta)-1]/theta. Answer 0.

1.8, page 55, Questions 8 and 12:Use any method to build a table for the values indicated in the book (0.1, 0.01, 0.001, 0.0001 and negatives) to find the limit as x-> 0 for f(x) = x^2 - 1, and f(x) = sin(3x)/x. I have taught VARS Yvars Function Y1, then use Y1(0.1) to find f(0.1) etc., using 2ndEnter/Entry key. Answers: -1 and 3.

1.8, page 22, Estimate how close theta should be to 0 to make sin(theta)/theta stay within 0.001 of 1. [Answer 0.077 by trial and error or by intersecting f(x) and 0.999 which is at (0.07747129, 0.999).]

1.8, page 56, Questions 32, 34. Rational functions as x->infinity. [Answers: infinity, 0.]

1.8, page 56, Question 36 [Answer 3/2]. Why is the limit [x->infinity]e^(-x) = 0?

E. Looking ahead
A glimpse into formal definitions of limits with epsilon and delta as well as the formal definition of continuity.

F. Assign Homework and warn about possible Quiz
Re-assign the homework due today for the next class.
Assign HW#16B (Note: it is from Chapter 2.1, not 1.8.)
A quiz on 1.6, asymptotes and 1.7 continuity is possible for the next class.
The next test is the last class of the week, 9 days from now.

G. How did the class go?