Topic #3: Limits (Math 31)

GOAL: Limits.

LIMITS

1. Examples of "limit processes":
    a. Area
    b. Volume
    c. Length: Have them write down their idea.
    d. Tangent
2. Idea:
    a. Devise a process involving an infinite number of steps, and you want the value at the last step; OR
    b. Devise a process involving an infinite number of steps, and each step gets you closer to the final answer.
3. Do limit example with: $f(x) = x^2 + 3$
4. Working definition of limit: What is "the limit of f(x) as x approaches a"? Look at the corresponding y values to see what number they approach.
5. Notation: If the "limit of f(x), as x approaches a, equals L" we write: $\lim_{x \to a} f(x) = L$
6. Note: Do not care what happens at the number. Visual example
7. Examples from equation, done numerically
    a. $f(x) = (x^3 - 1)/(x - 1)$ as x goes to 1 (equals 3)
    b. $f(x) = (x^2 - 5x + 6)/(x - 2)$ as x goes to 2 (equals -1)
8. Note last examples: Functions with "holes"

CALCULATING LIMITS

9. Direct substitution: For polynomials and (where defined) rational functions.
    a. Try in some above examples. With different limit direction for x.
10. Limits requiring algebra first
    a. Do above with algebra.
    b. $f(x) = 3(x^2 - 25)/(x + 5)$ as x goes to -5
    c. $f(t) = 3(t^2 - 25)/(\ (t + 5)(t - 5)\ )$ as x goes to -5, and as x goes to 5
    d. $g(x) = 5(2x^2 - 5x - 3)/(x - 3)$ as x goes to 3

LIMITS NOT EXISTING

11. Section 2.2 (Page 156/157): 50 – 54
12. Example: Give limit values and sketch graph like that.
13. Example (visually) of graph with break; limit DNE. Do a few more visual examples
14. Piecewise defined examples
    a. [MAKE ONE THAT DOES NOT]
    b. [MAKE PIECEWISE THAT DOES EXIST]