Calculus 1A: Homework Assignments. Notes and Hints.

Revised 2/09/09

Spring 2009, TT 3:30pm - 5:00pm, Room 105 Stanley Hall

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HW4. Read §2.8, §3.1-3.2, skim §3.3. Solve and Write Problems:

(1) §2.8: #2,3,4,7,8,9,11,30(a)-(c),32(a),36,50; Review for Chapter 2: #36,46(a)-(c).

(a) #3: don't forget to give some reason for your answers, e.g., a "sharp corner" indicates no derivative there; or the slopes of the tangents approach 0 as $x \to \infty$, etc.; one good reason is sufficient per graph.

(b) #4,7,8,9,11: it is best to use different color pens for the original function, for the tangent lines that you will be using, and for the derivative function; first look for any horizontal tangents - these will indicate the zeros of your derivative function; then between every two such tangents draw a few test tangents to see what their slopes are and plot the corresponding points on the graph of the derivative; look also for possible places where the derivative is not defined; if you have trouble with any of these, compare with the answers of the odd problems at the end of the textbook, but do attempt these problems first before peeking there.

(c) #30-32: you can use any of the two ways (limit formulas with (a, x) or (x, h)) for derivative functions which we discussed in class; make sure you don't forget to include the domain of the original function and the domain of the derivative function. Note that in this Chapter 2, when you are asked to find a derivative function for $f(x)$ given by a formula, you can use only the derivative definition methods we have discussed (Hold your horses! **No** differentiation laws from Chapter 3 for these problems!)

(2) §3.1: #10,20,22,26,30,32,38,44,46,56,68,70*.

(a) So far we have only DLs for addition, subtraction and multiplication by constants, plus base cases for power functions x^n and the exponential function e^x; thus, do **not** use any DLs for product or quotients! Check in particular, #10,20 - rewrite these functions as sums or differences of functions so that you can apply the DLs we know, i.e., in #22: multiply through and simplify **before** applying any DL's; in #24 split the fraction along the numerator and simplify **before** applying any DL's, etc.

(b) Compare #44 with #43, #46 with #45, #56 with #55. In #44, 56: as usual, replace "screen" by "paper"; use for e an approximation of 2.7; and obviously, you may want to use your ordinary calculator for finding several points on the graph. In #68: calculate the left-side derivative and the right-side derivative at the "troublesome" points, using same technique as for limits of piecewise-defined functions; it may be easier to see what is happening if you first draw the graph of $g(x)$, and use it to find the graph of its derivative $g'(x)$ and determine where $g(x)$ is not differentiable.

(3) §3.2: #2,4,6,12,22,24,30,32,44,48,52,58*.

(a) #44,48: just write first everything out as if you are appyling the DL's to the functions $f(x)$ and $g(x)$, and at the end substitute what you are given about the functions.

(b) #52: what is the slope of the line $x - 2y = 2$? Solve for y to find this slope, and set your derivative $y'(x) =$this slope. Find the derivative $y'(x)$, and solve for x the equation $y'(x) =$this slope.

Note: Problems indicated with "$*$" mean that they are probably more difficult and/or require some extra problem-solving techniques or reasoning.