REVIEW FOR TEST 2 OF CALCULUS I:

The first and best line of defense is to complete and understand the homework and lecture examples. Past that my old test might help you get some idea of how my tests typically look (although our course differs significantly in content). Most of the test will be like problems you've done before, they may not be the same format but they should require the same skill set. There will be about 5% which is more challenging and 5pts bonus (which could be on complex variables or hyperbolic). The page numbers on this review refer to my course notes.

Conceptual Fundamentals:

1. Know the definition of the derivative as a function in terms of a limiting process.

2. Distinguish between the slope of the tangent line and the derivative function.

3. Be able to find the equation of tangent line at a point.

4. Be able to analyze graph of f(x) verses f'(x) like in #3 or 41 of section 3.2.

5. Be able to work word problems like those in the Required Homework (excluding 3.2 #53, 3.5#87, 3.6#45 and 53)

6. Definition of velocity and acceleration given the position as a function of time.

7. Know your graphs, all the graphical and algebraic items I listed on the first test still can come up here. You need to know the general formula for a quadratic, cubic etc… Graph of sin(x), cos(x), ln(x) and so forth…

8. Notation! Please make sure to use notation that is clear and correct. If you write that a function is equal to its derivative (like cos(x) = -sin(x)) then bad things will happen. Also, you should never write d/dx = stuff in this course. d/dx always acts on something. (I would not be happy if I saw f(x) = cos(x) so d/dx = -sin(x).)

Calculational Foundations:

1. Linearity, linearity, linearity. Be able to split up problems and attack each piece one at a time when the difficulty suggests it is wise. For example, differentiate
$$f(x) = x^{(x\cos(x))} + \sqrt{\tan(x)}(x^2 - x)^3 \sec(x) e^{ax^3}$$
You don't want to do it all at once, split this into two problems then combine the answer at the end; you should explain that is what you are doing with appropriate notation.

2. Memorize all the basic derivatives. Many of you have relied on the text for looking up the formulas; you will not have that luxury on the test. So memorize the formulas to begin and check yourself as you study. (see page 79's table for a complete list of the basic derivatives you are expected to know)

3. Know the product, quotient and chain rules. Know how to apply them

4. Know difference between explicit and implicit functions of x. Be able to differentiate implicitly and find tangent line to implicit function. For example, be able to find tangent line to $x^2y + xe^y = 7$ at the point (7,0).

5. Be able to use logarithmic differentiation when it is helpful, or indispensable.

Proof-type Responsibilities:

1. Be able to supply a proof of the product rule in the case that the functions are strictly positive. That is for $f(x), g(x) > 0$ for all x.

2. Be able to derive the formulas for the derivatives of the inverse functions as I did in lecture and the notes. In particular, Examples 4.9.4 , 4.9.5, 4.9.5, 4.9.6, 4.9.7, 4.9.8, 4.9.9, 4.9.11,

3. Be able to show the derivatives of the reciprocal trig. Functions are what they are on the basis of the quotient rule applied to quotients of sine and cosine. This was done for tangent, secant and cosecant in Examples 4.7.1, 4.7.4. I also expect you could do cotangent if I asked.

Leave no stone unturned. Monday will be devoted to answering any questions you have. I do not plan to lecture formally; it will be totally up to you to supply questions.