Calculus I Russell Brown
Review for exam 2 October 11, 2000

Review material for exam 2. Note that some of this is repeated from the earlier handout.

1. The derivative, the integral and the limit are the three most important gadgets in calculus. We studied the limits for the previous exam. Integrals are not until after the next exam. Which definition do you think you will need to know for exam 2?

2. You should be able to construct the correct statement of the product, chain, quotient and sum rules. I would like you to understand how to prove all four of these rules. However, I have only asked you to learn the proof of one of these rules. Which one is it? When you are studying the proof, you should not only study the proof of the stated result, but you should also make sure that you understand the results that are used in the proof.

3. Know the derivatives of sin, cos, tan and sec. Understand how to use the quotient rule and the derivatives of sin and cos to derive the derivatives of the remaining trigonometric functions.

4. Don't think that this course is "all theory". In addition to the above, you should be able to differentiate quickly and efficiently.

5. Know the interpretation of the derivative as a rate of change, velocity or slope of the tangent line.

6. Be able to compute higher order derivatives (see 4, above).

7. Know all three notations used for the derivative.

8. Work problems involving the motion of a thrown object moving under the force of gravity. (See 3.7, #34, 36, sample test #42).

9. Implicit differentiation. Know how to carry out implicit differentiation. Use implicit differentiation to find tangent lines to implicitly defined curves. Use implicit differentiation to find derivatives of simple functions such as $x^{1/n}$. Be able to recognize when curves intersect at right angles.

10. Related rates. Concentrate on problems involving right-angle geometry and trigonometry. (See 3.9 #3, 6, 7, 10, 14, 15, 16, 19, sample test #50, 51).

11. Differentials and approximations. Use tangent lines to approximate functions. For example, show how the tangent line allows us to easily compute an approximation to $\sqrt{101}$. Here, easy is defined to mean without a calculator.