

REMARKS: Please note that approximately 85 out of 200 points on this exam will depend on your being able to differentiate correctly. (Recall that being able to do substitutions in integrals requires you to be able to recognize an appropriate u and differentiate it!) Thus, aside from anything else, you'll want to make certain that your differentiation skills are rock-solid walking into the final. You will also notice that the exam has 44 points (problems 5, 6 and 7) that will depend upon your antidifferentiation skills, including substitution. Thus, this should be another area of intensive practice for you.

Math 229, FINAL EXAM OUTLINE, Spring 2011

1. (24 points) Compute four relatively complex derivatives.
2. (6 points) Find the equation of the line tangent to a curve at a point, using implicit differentiation. (Review Section 3.6.)
3. (6 points) Find a partial derivative.
4. (28 points) Compute four nontrivial limits. (Includes limits at real numbers and limits at \pm infinity. Don't forget to review the special limits at 0 for $\sin(x)/x$, $\tan(x)/x$, and basic applications of the Squeeze Theorem.
5. (8 points) Initial value problem.
6. (18 points) Find three general antiderivatives, emphasis on substitution.
7. (18 points) Evaluate three definite integrals.
8. (8 points) Approximate the value of $\int \dots$ by the Riemann sum with $n = ?$ and sample points taken to be \dots
9. (6 points) Test understanding of FTC 1.
10. (8 points) Find the absolute maximum and absolute minimum values of a continuous function on a closed interval.
11. (10 points) Use the **definition** of the derivative as a limit of average rates of change to compute $f'(x)$, where $f(x) = \dots$. (No credit will be given for a calculation using the differentiation formulas!)
12. (8 points) Test understanding of continuity at a point, left- and right-hand limits.
13. (28 points) Sign analysis and graphing. (local extrema, inc/dec, inflection points, concavity, vertical asymptotes, end behavior)
14. (8 points) Test understanding of IVT/MVT/Rolle's Theorem.
15. (8 points) Optimization under constraint.
16. (8 points) Related rates or Newton's Method.