Test 2 Topics

Calculus Theory 1

March 22, 2011

1 Chapter 9

1. The definition of a derivative and its geometric interpretation. What it means to be differentiable at a point a, on an interval (a, b), and on all of $\mathbb{R}$. Know both the Lagrange notation $f'(x)$ and the Leibniz notation dy/dx. Know the notation for and how to compute higher order derivates $f^{(n)}(x)$.

2. Be able to calculate the derivative of a simple function from its definition (problems 1–4, examples in the main text).

3. Rectilinear motion: If the position of a particle moving along a line is given as $s(t)$, then $v(t) = s'(t)$ is the velocity and $a(t) = s''(t)$ is the acceleration of the particle. Know how to solve such problems (for example problems 11 and 12).

4. Know the precise statement and proof of theorem one, that differentiability implies continuity. Know the standard counterexample to the converse of this theorem.

2 Chapter 10

1. The rules of calculus: linearity, the product and quotient rules, and the chain rule. You should be able to prove theorems 1–3.

2. Know the derivatives of x^n (for all $n \in \mathbb{Z}$), $\sin x$, $\cos x$, e^x, $\tan x$ and $\sec x$. Be able to prove theorem 6 (using induction).

3. Be able to calculate the derivatives of simple and complicated functions, such as those in problems 1–6, the handout from Anton's Calculus text, and the quiz. Be able to solve the problems quickly and accurately, and be especially comfortable with the chain rule.

4. Be able to solve related rates problems such as problems 7–9.

5. Be able to solve problems similar to 16 and 24 on your problem set.

6. You don't need to know the proofs of theorems 4, 5 and 7–9 in the text.