

Review Outline and Plan of Study Attack for the Final Exam

Math 111–D. Benedetto

Chapter 1: Functions and Limits

- Functions, piece-wise defined function, composition of functions
- Limits
- Epsilon-Delta proofs
- Continuity

Chapter 2: Derivatives

- Limit Definition of the Derivative
- Differentiation Rules: Product, Quotient, and Chain Rules
- Implicit Differentiation
- Tangent Lines
- Related Rates

Chapter 3: Applications of Differentiation

- Extreme Values (Maximum or minimum values), Closed Interval Method
- Curve Sketching: relating a function's derivative information to the function's graph. Limits at $\pm\infty$ (horizontal asymptotes), vertical asymptotes, domain, etc.
- Optimization/Max-Min Problems
- Antiderivatives, Rectilinear Motion, Initial-Valued Differential Equations

Chapter 4: Integrals

- Areas and Riemann Sums
- Fundamental Theorem of Calculus, Parts I and II
- Integration: definite and indefinite integrals, including absolute values
- Position, Velocity, Acceleration relationships
- Displacement, Total Distance
- Integration by Substitution, for both definite and indefinite integrals

Chapter 5: Applications of Integration

- Area Between Curves
- Volumes of Revolution: Disc and/or Washer methods

Chapter 6: Exponential and Logarithmic Functions

- Exponential and Natural Logarithm Functions, $y = e^x$ and $y = \ln x$.
 - Graphs
 - Properties
 - Limits
 - Derivatives
 - Integrals
 - Logarithmic Differentiation
 - Implicit Differentiation
 - Tangent Lines
 - Max-Min Problems
 - Curve Sketching
 - Area between Curves
 - Volumes of Revolution

Plan of action:

- **Suggested Schedule** starting Monday December 10th
 - **Monday 10th:** Chapter 1
 - **Tuesday 11th:** Chapter 2 and **Review Exam #1**
 - **Wednesday 12th:** Chapter 3
 - **Thursday 13th:** **Review Exam #2**
 - **Friday 14th:** Chapter 4
 - **Saturday 15th:** Section 5.1/ and Section 6.2 and **Review Exam #3**
 - **Sunday 16th:** Sections 6.3 and 6.4 (new!) Natural Log and especially (new!) Section 5.2 Volumes of Revolution
 - **Monday 17th:** **Practice Final Exams**
 - **Tuesday 18th:** Visit Office Hours, Review Everything, find remaining concerns.
 - **Wednesday 19th:** **Final Exam 2–5:00 pm**, Beneski 107
- Approach studying for the final one day at a time. I am suggesting that you all study a small chunk of this material each day for the entire week before the final. This way you will not be overwhelmed! You can also come to my office hours.
- The good news is that in recent weeks the Calculus we've seen has built on previous ideas, so we've been bumping into natural ways of reviewing... for instance, we use the chain rule all the time in our recent studies of say applications of the derivative or with new functions like exponential and logs, but you should still go back and review that piece regardless. I have tried to keep reminding you of old familiar ideas, but some ideas, like *epsilon-delta* proofs have not been used in a while. Refresh your memory on those seemingly more independent concepts.
- Keep straight the two different approaches for Related Rates and Optimization problems
- Go back and look at the previous Review Packets of Problems. If you no longer have them, they, along with their answer keys, are posted on-line on our class webpage.

<http://www.cs.amherst.edu/~danielle/math111/>

- Pick a few problems from each section and try them, **without** looking at the answers first. If you get them all right, move onto the next section. There is no need to make up more study problems, between all of my review packets, homework problems, or class notes, we have found enough problems.
- Study the *approach* to solving each type of problem, as well as fine tune the technical skills needed. I am more interested in the process of problem solving than the final answer.
- Review our previous 3 exams.
- **Know when my office hours are.** Otherwise, make an appointment.