Review Outline and Plan of Study Attack for the Final Exam
Math 111–D. Benedetto

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Chapter 1: Functions and Limits

- Functions, piece-wise defined function, composition of functions

- Limits

- Epsilon-Delta proofs

- Continuity

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Chapter 2: Derivatives

- Limit Definition of the Derivative

- Differentiation Rules: Product, Quotient, and Chain Rules

- Implicit Differentiation

- Tangent Lines

- Related Rates

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Chapter 3: Applications of Differentiation

- Extreme Values (Maximum or minumum 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

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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

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Chapter 5: Applications of Integration

- Area Between Curves

- Volumes of Revolution: Disc and/or Washer methods

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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

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Plan of action:

- **Suggested Schedule** starting Tuesday December 10th

  - **Tuesday Dec 9th:** Chapters 1 and 2, and **Review Exam #1**

  - **Wednesday Dec 10th:** Chapter 3 and and **Review Exam #2**

  - **Thursday Dec 11th:** Chapter 4 and try **at least** one practice final exam

  - **Friday Dec 12th:** Section 5.1/ and Section 6.2 and **Review Exam #3**

  - **Saturday Dec 13th:** Sections 6.3 and 6.4 (new!) Natural Log and especially (new!) Section 5.2 Volumes of Revolution Study Break: Benedetto House 7–9:00pm

  - **Sunday Dec 14th: Practice Final Exams**

  - **Monday Dec 15th: Final Exam 2–5:00 pm**, MERR 403

- 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 reminded 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://www3.amherst.edu/~dbenedetto/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.