

Final Exam Study Guide

The **Final Exam** is scheduled for **Friday, November 20th**

I recommend starting with your old tests; look over the posted solution keys. Rework the version of the test that you did not have so you can assess your understanding. Make a note of the problems you are having trouble with and go back and do more of that type. Go back over the 4 review sheets from the 4 tests with the problems listed on those for practice. Go back over the problems done in class notes, recitations, and the exercises in WebAssign (many of those same exercises can be found in your textbook).

The three main topics in this course are limits, derivatives and integrals. The smaller topics are things like Related Rates, Optimization, Newton's Method, Parametric Equations, Graphing, Linearization, Riemann Sums, Volumes of revolution.... See the list below of all of our covered topics. The table of contents from all our text chapters is a great place to reference also. Write out definitions and theorems you need to review.

I. Prerequisites

- Compute $\sin(\theta)$, $\cos(\theta)$, $\tan(\theta)$ for $\theta = 0, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$
- Determine if an equation represents a function
- Graph basic functions:
conic sections, exponentials, logarithms, polynomials, fractional powers, rationals, trig., inverse trig.
- Use the laws of exponents and logarithms

NOT TESTING: Sets, Parametric Curves

II. Limits

- Right and Left-hand limits
- Using Graphs to find limits
- Epsilon-delta definition
- Limit Theorems/Properties
(See page 27 of Chapter 1)
- Limits at $\pm\infty$
- Infinite Limits
- L'Hopital's Rule
- Squeeze Theorem

III. Continuity

- 3 Types of discontinuities
(What are their names, when do they occur?)
- Intermediate Value Theorem

IV. Derivative

- Limit Definition
- When a derivative exists and when it doesn't exist
(There are 3 cases where it doesn't, what are they?)
- Derivative at a point interpretations:
instantaneous rate of change, slope of tangent line

- Lots of Derivative Rules
constant multiple, sum & difference, power rule, product and quotient rule, chain rule, trig. functions, inverse trig. functions, exponential functions, logarithmic functions
- Implicit differentiation
- Logarithmic differentiation
- Derivative as a function:
 - 1st, 2nd, and higher derivatives
 - Examples using position, velocity, acceleration

V. Applications of Derivative

- Related Rates
- Newton's Method
- Extreme Value Theorem
- Graphing techniques:
 - Finding local and absolute extrema
 - Intervals of increasing/decreasing
 - Finding inflection points
 - Intervals of concave up/down
 - Sketching graphs
- Optimization

VI. Integrals

- Definition of Antiderivative
- Definition of Indefinite Integral
- Areas & Riemann Sums
- Limit definition of Definite Integral
- Interpreting Definite Integral as area under a curve
- Properties of the Definite Integral
- Fundamental Theorem of Calculus Part 1 and 2
- Techniques of integration:
 - U-substitution
 - Integration by Parts

VII. Applications of Integrals

- Integration of velocity and acceleration
- Areas between curves
- Volumes of Revolution:
 - Disk Method
 - Washer Method
 - Shell Method