1 Final Exam - Winter 2011

You may find this review sheet useful as you study for the final exam. It is not intended to be fully comprehensive, and you should not rely on it as your only resource while preparing for the exam. Your best study aid is to review the team and web homework assignments, the previous exams posted online and practice problems from the book.

1.1 Announcements about the Final Exam

Here is some important information for the Final Exam:

- The final exam is on Monday April 25, 8 am (sharp) - 10 am. Please arrive early to your exam room to have enough time to seat you.
- Final exam room assignments are posted on the course website http://www.math.lsa.umich.edu/courses/116/roomassignmentsW11.html. Please check to find where your section is located, as you may be in a different location than for the midterm exams. Make sure you find the exam room before the morning of the exam.
- You should bring your graphing calculator (make sure your batteries are okay!), one 3” x 5” note card, student ID, and pencils.
- The final exam is cumulative, it covers the following sections: 4.8, 5.1-5.4, 6.1-6.2, 6.4, 7.1-7.2, 7.5, 7.7-7.8, 8.1-8.5, 8.7-8.8, 9.1-9.5, 10.1-10.3, and 11.1-11.6.
- You will get a formula sheet for the exam. The formula sheet is posted on the course website.

1.2 Writing Your Best Solution

Be careful in the presentation of your solutions. Some things to consider:

- Show enough work to justify your answer unless the directions note otherwise.
- Make sure your work is neat and organized so that the graders can follow it. Work that cannot be read cannot be graded.
- Always include units in your answer when it is appropriate.
- If you use a table or graph to explain your answer, then you must include the appropriate table or graph as part of your solution and refer to it in your explanation. You will not receive full credit if you do not include these items but have referred to them in a solution.
- Label your graph axes with appropriate variables.
- If you use your calculator to determine a numerical approximation, you must show the expression that you are approximating and note that you used your calculator for the numerical answer. Numerical answers without proper justification will not receive full credit.
- Write in pencil (not pen) so that you can erase mistakes.
1.3 Mathematical Clarity

It is important that you are careful with mathematical notation and expressions. To receive full credit, remember to adhere to the following:

- Use the correct variables. If the problem is given for variable \( z \), don’t use variable \( x \) - it makes no sense in the context of the problem.
- Be careful with limit notation. Use it when necessary, and use it throughout the solution as long as it is appropriate.
- Be careful with indices while using summation notation.
- Numerical approximations are not exact answers. If asked to give an exact answer, make sure you do so for full credit and do not include an approximation.

2 Reviewing the Material

You may find the following outline helpful as you review the material that you have learned this term. This outline is not intended to be exhaustive.

2.1 Sections 9.1-9.5

- Bounded sequences,
- Increasing and decreasing sequences.
- Finding the limit of a sequence.
- What is a geometric series?
- Find the sum of a finite geometric series
- Find the sum of an infinite geometric series (when can we do it?)
- Write a series using summation notation
- Convergence of a series and properties
- Tests for convergence: integral, p-series, comparison, limit comparison, ratio, alternating series, convergence of absolute values, etc. Make sure to state the name of the test you are using on your answers.
- Word problems with series.
- Conditional and Absolute convergence.
- Computation of error bounds for alternating series.
- Power series: radius of convergence and interval of convergence.

For the final, you will not need to define sequences recursively.
2.2 Sections 10.1-10.3

- Find the Taylor polynomial of degree $n$ approximating $f(x)$ near $x = a$
- Find the Taylor series for $f(x)$ about $x = a$.
- Determine the interval of convergence for a Taylor series
- Write a Taylor series using summation notation
- Exactly evaluate an infinite sum using Taylor series
- Find new Taylor series from old Taylor series using substitution, arithmetic, differentiation, and integration
- Use Taylor series to make approximations

2.3 Material from Exam 1

- Graphical and verbal interpretations of definite integrals
- The Fundamental Theorem of Calculus
- Average value of a function
- Properties of definite integrals
- Construct antiderivatives graphically, numerically, and analytically
- The Second Fundamental Theorem of Calculus
- Integration techniques: substitution and integration by parts
- Numerical methods: Left-Hand Sum, Right-Hand Sum, Midpoint Rule, Trapezoid Rule.
- When do any of the Riemann sums ($Left(n)$, $Right(n)$, $Trap(n)$ and $Mid(n)$) yield an overestimate or underestimate?
- Applications using definite integrals: area, volume, density, center of mass, work, force, and pressure

2.4 Material from Exam 2

- Differential equations
- Slope fields
- Using Euler’s method to approximate solutions of differential equations
- Solving differential equations using separation of variables
- Modeling with differential equations.
- Finding equilibrium solutions and their stability (from slope fields or the differential equation itself).
- Parametric equations
- Polar coordinates
• Improper integrals.
• Comparison of improper integrals
• Probability density functions and cumulative distribution functions and their respective graphs and interpretations
• Mean and median

For the final exam, you do not need to know the normal distribution density function. If you have more questions, please contact your instructor. Good luck on the final!