RUTGERS
UNIVERSITY | NEWARK

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Complex variables

Fall 2016

List of topics for Test #2

The list of topics for Test #2 includes everything from the beginning up to Chapter 4.2: Series of complex numbers (Monday 11/7 class). The main focus will be on Chapters 2 and 3.

Chapter 1: Complex numbers and the complex plane

You should review Chapter 1, at least go through your notes carefully. For details on what to review (and how) for this chapter, refer to the list of topics for Test #1.

Chapter 2: Complex-valued functions of a complex variable

Review all of chapter 2 in depth, namely:

- 2.1 Basics: Definitions related to functions $\mathbb{C} \to \mathbb{C}$, images and preimages of points and of sets, injectivity, surjectivity and bijectivity, examples, etc.
- 2.2 Continuity: definition, characterization, examples, topological properties of continuous functions.
- 2.3 Real differentiability. You will not be asked questions that are directly related to this section, but it does not hurt to review it nevertheless.
- 2.4: Complex differentiability (holomorphicity): Definition of holomorphicity, Cauchy-Riemann equations (3 versions), operations on holomorphic functions, properties of holomorphic functions.

Exercises: For this chapter, go over homework #4, #5, #6 and quizzes #4, #5.

Chapter 3: Examples of holomorphic functions

Review all of chapter 3 in depth, namely:

> 3.1 Polynomials: Definition and examples, roots and multiplicities, derivatives, Taylor expansions.

> 3.2 Rational fractions and Möbius transformations: Definition, zeroes and poles, examples, Möbius transformations, properties of Möbius transformations.

> 3.3 Exponential and trigonometric functions: Review exponential function, definitions and properties of the complex sine, cosine and tangent, and definitions of the complex hyperbolic sine, cosine and tangent.

Exercises: For this chapter, go over homework #7, #8, and quizzes #6, #7.

Chapter 4: Power series

Review section 4.1 and 4.2 of chapter 4: Sequence and series of complex numbers.

Exercises: For this chapter, go over homework #9.

Advice

- Your lecture notes from class should be your primary (if not only) source of information. You are expected to know all the material in your lecture notes, and no other (unless you are told otherwise occasionally). Review your lecture notes regularly and thoroughly.
- Remember that all past quizzes, tests and homework exercises sheets are available on the course web page. Make sure you go over all of them (or as many as you can).
- I am happy to answer your questions, as long as: 1. They are math questions, and 2. You have made a genuine effort to think about your question before contacting me.
- The best way to prepare for the exams is to work regularly, make sure you understand all the material as it is being taught, do all the homework exercises, etc. Don't wait until the last moment to prepare. Don't try to guess what will be on the test, your time is best spent preparing for every possibility.