Complex Analysis

George Cain

Table of Contents

Chapter One - Complex Numbers

- 1.1 Introduction
- 1.2 Geometry
- 1.3 Polar coordinates

Chapter Two - Complex Functions

- 2.1 Functions of a real variable
- 2.2 Functions of a complex variable
- 2.3 Derivatives

Chapter Three - Elementary Functions

- 3.1 Introduction
- 3.2 The exponential function
- 3.3 Trigonometric functions
- 3.4 Logarithms and complex exponents

Chapter Four - Integration

- 4.1 Introduction
- 4.2 Evaluating integrals
- 4.3 Antiderivatives

Chapter Five - Cauchy's Theorem

- 5.1 Homotopy
- 5.2 Cauchy's Theorem

Chapter Six - More Integration

- 6.1 Cauchy's Integral Formula
- 6.2 Functions defined by integrals
- 6.3 Liouville's Theorem
- 6.4 Maximum moduli

Chapter Seven - Harmonic Functions

- 7.1 The Laplace equation
- 7.2 Harmonic functions
- 7.3 Poisson's integral formula

Chapter Eight - Series

- 8.1 Sequences
- 8.2 Series
- 8.3 Power series
- 8.4 Integration of power series
- 8.5 Differentiation of power series

Chapter Nine - Taylor and Laurent Series 9.1 Taylor series

- 9.2 Laurent series

Chapter Ten - Poles, Residues, and All That

- 10.1 Residues
- 10.2 Poles and other singularities

Chapter Eleven - Argument Principle 11.1 Argument principle 11.2 Rouche's Theorem

George Cain School of Mathematics Georgia Institute of Technology Atlanta, Georgia 0332-0160

cain@math.gatech.edu