

# Complex Analysis, Steins and Shokaridi

## Chapter 2 Cauchy's Theorem and Its Applications

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### Exercises

1. We seek the antiderivatives for the second integrals

$$\int_{\gamma} \frac{1}{z^2} dz = \int_{\gamma} \frac{1}{z^2} dz = \frac{1}{-1} \frac{1}{z} = -\frac{1}{z}$$

2. We seek the antiderivatives for the Cauchy integrals

$$\int_{\gamma} \frac{1}{z} dz = \log z$$

3. Evaluate the integral  $\int_{\gamma} \frac{1}{z^2} dz$  in (a) and (b) by means of integral (1) and (2)

4. Prove that for all  $\gamma \in \mathbb{C}$ , we have  $\int_{\gamma} \frac{1}{z} dz = \log z + C$  in (a) and (b)

5. Show that Cauchy's theorem for paths homotopic to zero holds for all closed curves that (1) are continuously deformed differentiable in (a) (b) (c)

6. Let  $\gamma$  be a piecewise smooth arc in  $\mathbb{C}$  and let  $f(z)$  be a function defined on  $\gamma$  which is also continuous on  $\gamma$ . Suppose that  $f(z)$  is holomorphic on  $\gamma$  except possibly at a point  $z_0$  inside  $\gamma$ . Prove that if  $\gamma$  is bounded then  $f(z)$  is holomorphic on  $\gamma$ .

$$\int_{\gamma} f(z) dz = 0$$

# Elias Stein Complex Analysis Solution Manual

**Lingsheng Yao**



## **Elias Stein Complex Analysis Solution Manual:**

*Solutions and Answer Manual for Basic Complex Analysis* Michael J. Hoffman, Jerrold E. Marsden, 1973      **Complex Analysis** Elias M. Stein, Rami Shakarchi, 2010-04-22 With this second volume we enter the intriguing world of complex analysis. From the first theorems on the elegance and sweep of the results is evident. The starting point is the simple idea of extending a function initially given for real values of the argument to one that is defined when the argument is complex. From there one proceeds to the main properties of holomorphic functions whose proofs are generally short and quite illuminating: the Cauchy theorems, residues, analytic continuation, the argument principle. With this background the reader is ready to learn a wealth of additional material connecting the subject with other areas of mathematics: the Fourier transform treated by contour integration, the zeta function and the prime number theorem, and an introduction to elliptic functions culminating in their application to combinatorics and number theory. Thoroughly developing a subject with many ramifications while striking a careful balance between conceptual insights and the technical underpinnings of rigorous analysis, *Complex Analysis* will be welcomed by students of mathematics, physics, engineering, and other sciences. The Princeton Lectures in Analysis represents a sustained effort to introduce the core areas of mathematical analysis while also illustrating the organic unity between them. Numerous examples and applications throughout its four planned volumes, of which *Complex Analysis* is the second, highlight the far-reaching consequences of certain ideas in analysis to other fields of mathematics and a variety of sciences. Stein and Shakarchi move from an introduction addressing Fourier series and integrals to in-depth considerations of complex analysis, measure and integration theory, and Hilbert spaces, and finally further topics such as functional analysis, distributions, and elements of probability theory.      Problems and Solutions for Complex Analysis Rami Shakarchi, 1999-10-14 All the exercises plus their solutions for Serge Lang's fourth edition of *Complex Analysis* ISBN 0 387 98592 1. The problems in the first 8 chapters are suitable for an introductory course at undergraduate level and cover power series, Cauchy's theorem, Laurent series, singularities, and meromorphic functions, the calculus of residues, conformal mappings, and harmonic functions. The material in the remaining 8 chapters is more advanced, with problems on Schwarz reflection, analytic continuation, Jensen's formula, the Phragmén-Lindelöf theorem, entire functions, Weierstrass products, and meromorphic functions, the Gamma function, and Zeta function. Also beneficial for anyone interested in learning complex analysis.      *Books In Print* 2004-2005. Ed Bowker, Staff, Staff Bowker, Ed, 2004.      **Scientific and Technical Books in Print**, 1972.      **Forthcoming Books** Rose Army, 2003-04.      Scientific and Technical Books and Serials in Print, 1989.      **Solutions Manual for Complex Analysis and Applications** Jeffrey Alan, 2005-07.      **Whitaker's Cumulative Book List**, 1973.      American Book Publishing Record Cumulative 1993. R R Bowker Publishing, 1994-03. Cited in BCL3. Sheehy and Walford. Compiled from the 12 monthly issues of the ABPR, this edition of the annual cumulation lists by Dewey sequence some 41 700 titles for books published or distributed in the US. Entry information is derived from MARC II tapes and books submitted to R R Bowker.      *Books in Print*, 1977.

Subject Guide to Books in Print ,1971      **The Publishers' Trade List Annual** ,1979      **Paperbacks in Print** ,1972  
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of Modern Books Acquired British Library,1961      Subject Index of the Modern Works Added to the British Museum Library  
,1961      Subject Index of Modern Books Acquired 1881/1900-. British Museum. Department of Printed Books,1961  
**Complex Analysis and Special Functions with Mathematical Software Tools - Solutions Manual** Taylor & Francis  
Group,2010-08-21

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