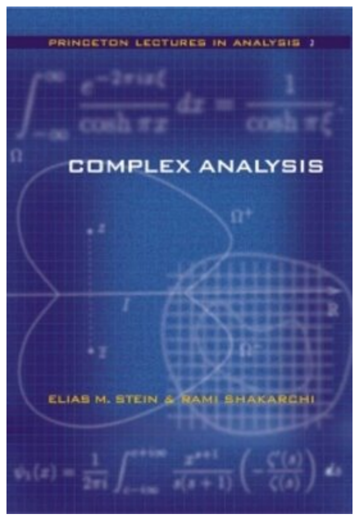
Complex Analysis Course Description

Course outline.
The course is a rigorous introduction to Complex Analysis, one of the most exciting fields of modern Mathematics. We will begin with a review of Complex numbers and their Geometric and Algebraic properties. After that, we will start investigating holomorphic functions, including polynomials, rational functions, and trigonometric functions. We will carefully discuss the differences between Real and Complex differentiation. Following that, we will take a Complex Analysis approach to line integration and derive the fundamental theorem of Complex Analysis, the Cauchy Theorem. This theorem has a number of dramatic consequences: the Cauchy representation fomula, Fundamental Theorem of Algebra, Maximum Modulus Principle, and many others. Developing the theory, we will study Residual Calculus and Harmonic functions. The culmination of the course will be proof of the celebrated Rieman mapping theorem, which asserts that any simply connected planar domains (i.e. "a domain without holes") which is not the whole plane can be bijectively mapped by a holomorphic map to the unit disk.



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