Preface

The purpose of this book is to give an exposition of the analytic theory of L-functions following the ideas of harmonic analysis inaugurated by Tate and Weil. The central theme is the exploitation of the Local Langlands' Correspondence for GL_n to obtain results that apply to both Artin-Hecke L-functions associated to representations of the Weil group and to automorphic L-functions of principal type on GL_n. In addition to establishing functional equations, explicit formulas and non-vanishing theorems, essential ingredients in any discussion of generalized prime number theorems, we also derive lower bound estimates for discriminants and conductors.

The author's intention has been to make available to a broad mathematical audience those aspects of the theory of L-functions that are closely related to the modern interconnections between the analytic theory of numbers and the theory of group representations.

A noteworthy characteristic property of number fields that distinguishes them from function fields is the existence of archimedean primes. These primes not only make their appearance as gamma factors, but also play a crucial role in controlling the analytic growth of L-functions and in the distribution of zeros and poles. In this spirit, we have placed a great deal of emphasis in the study of archimedean L-factors.

A detailed description of the contents of each chapter can be obtained from the introductory section. A survey of the local theory of root numbers is also included as an appendix.

This book is based on lectures given by the author over a period of several years first at the University of Illinois and more recently at the Graduate School and University Center of the City University of New York. The author acknowledges the help he has received from many of his colleagues and students. The appendix, written in collaboration with Aaron Wan, is the result of many fruitful discussions about root numbers, and for these the author is particularly thankful.

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