

Preface

Rome was not built in a day...

There is no shortcut to good scholarship. To learn mathematics you are to solve many ‘good’ problems without haste. Mathematics is not only for persons of talent. Tackling difficult problems is like challenging yourself. Even if you do not make a success in solving a problem, you may set some new knowledge or technique you lacked.

This book contains more than one hundred and fifty mathematical problems and their detailed solutions related mainly to Real Analysis. Many problems are selected carefully both for students who are presently learning or those who have just finished their courses in Calculus and Linear Algebra, or for any person who wants to review and improve his or her skill in Real Analysis and, moreover, to make a step forward, for example, to Complex Analysis, Fourier Analysis, or Lebesgue Integration, etc. The solutions to all problems are supplied in detail, which should compete well with the famous books written by Pólya and Szegő more than thirty-five years ago.

Some problems are taken from Analytic Number Theory; for example, the uniform distribution (Chapter 12) and the prime number theorem (Chapter 17). The latter is treated in a slightly different way. They may be useful for an introduction to Analytic Number Theory.

Nevertheless the reader should notice that all solutions are not short and elegant. It may always be possible for the reader to find better and more elementary solutions. The problems are merely numbered for convenience’ sake and so the reader should grapple with them using any tools, which makes a difference from the usual exercises in Calculus. One may use integration for problems on series, for example. The author must confess that there are some problems expressed in an elementary way, whose simple and elementary proof could not be found by

the author. The reason why he dared to include such problems and the solutions beyond the limits of Calculus is leaving to urge the reader to find better ones.

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Enjoy mathematics with a pen !

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