Preface to the Second Edition

> *Since arts are more easily learnt by examples than precepts, I have thought fit to adjoin the solutions of the following problems.*
>
> Isaac Newton, in *Universal Arithmetick*

Learning is a mysterious process. No one can say what the precise rules of learning are. However, it is an agreed upon fact that the study of good examples plays a fundamental role in learning. With respect to mathematics, it is well-known that problem-solving helps one acquire routine skills in how and when to apply a theorem. It also allows one to discover nuances of the theory and leads one to ask further questions that suggest new avenues of research. This principle resonates with the famous aphorism of Lichtenberg, "What you have been obliged to discover by yourself leaves a path in your mind which you can use again when the need arises."

This book grew out of various courses given at Queen's University between 1996 and 2004. In the short span of a semester, it is difficult to cover enough material to give students the confidence that they have mastered some portion of the subject. Consequently, I have found that a problem-solving format is the best way to deal with this challenge. The salient features of the theory are presented in class along with a few examples, and then the students are expected to teach themselves the finer aspects of the theory through worked examples.

This is a revised and expanded version of "Problems in Algebraic Number Theory" originally published by Springer-Verlag as GTM 190. The new edition has an extra chapter on density theorems. It introduces the reader to the magnificent interplay between algebraic methods and analytic methods that has come to be a dominant theme of number theory.

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