

**Exercises.** Throughout the book, there are a lot of problems to be solved. Easy questions, moderate questions, hard questions, exceptionally difficult questions. No one should do them all. The idea of having so many problems is to give the teacher options that are suitable for the students' backgrounds:

An unusual feature of the book is that exercises appear embedded in the text.<sup>3</sup> This is done to enable the student to complete the proofs of theorems as one goes along.<sup>4</sup> This does not require the students to come up with new ideas but rather to follow the arguments given so as to fill in the gaps. For less experienced students it helps to write out the solutions to these exercises; more experienced students might just satisfy themselves that they can provide an appropriate proof.

Other questions work through examples. There are more challenging exercises throughout, indicated by the symbol  $\dagger$  next to the question numbers, in which the student will need to independently bring together several of the ideas that have been discussed. Then there are some really tough questions, indicated by the symbol  $\ddagger$ , in which the student will need to be creative, perhaps even providing ideas not given, or hinted at, in the text.

A few questions in this book are open-ended, some even phrased a little misleadingly. The student who tries to develop those themes her- or himself, might embark upon a rewarding voyage of discovery. Once, after I had set the exercises in section 9.2 for homework, some students complained how unfair they felt these questions were but were silenced by another student who announced that it was so much fun for him to work out the answers that he now knew what he wanted to do with his life!

At the end of the book we give hints for many of the exercises, especially those that form part of a proof.

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<sup>3</sup>Though they can be downloaded, as a separate list, from [www.ams.org/granville-number-theory](http://www.ams.org/granville-number-theory)

<sup>4</sup>Often students have little experience with proofs and struggle with the level of sophistication required, at least without adequate guidance.