A Note to the Student: What This Book Expects from You

What this book expects from you is your active participation. I recently asked Amy, a student who studied out of Chapter Zero last year, if she had any advice for students who would be using the second edition of the book. Here was her response to you:

Chapter Zero requires active learning, based on a high level of interaction between you and the book. Concepts build on one another and you need to understand the definitions before you can apply them. When you come to a definition, read the accompanying discussion and think about it, try to rephrase it in your own words and also to come up with examples that illustrate it. This will get you thinking about the topic and will help you understand it. If you still don’t understand it, ask for help.

The “high level of interaction” of which Amy speaks requires that you keep pencil and paper handy when you are reading the book. In addition to reflecting on ideas, you will be called upon to work out exercises as you go along. Items marked “Exercise” are designed to contribute to the reading and are usually straightforward. You should work them as soon as you encounter them. Items marked “Problem” or “Theorem” also need your immediate attention, although you do not necessarily need to solve or prove them at once. Instead, you should make sure you understand what is being asked or asserted and how it fits in with the topic being explored. You can go back and work on the full solutions later. “Theorems” are big results and (except in a few explicitly stated exceptions) are part of an unbroken chain of reasoning built in the book. “Problems” may be less formal and sometimes call upon intuitive mathematical notions outside of the rigorous development in the text in order to illustrate a concept.

In the book you will find practical tips for approaching certain sorts of proofs. Do not make the mistake of glossing over these. They will be extremely useful and important.

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to you. My advice is to mark them in your book for easy reference and make a mental note of them; you may even wish to keep a list of them somewhere in your notebook.

As you proceed, do not imagine that you are leaving “completed” topics behind. Amy has advice to give here, too:

Don’t be afraid to refer back and forth between chapters. In fact, it is probably better to refer back and forth. Refresh your mind on old concepts every once in a while by skimming back through the early chapters. This will help in the long run.

I would add that referring to previous sections is not merely for review: The later encounters with a topic will yield additional insight.

At the ends of the chapters you will also find a number of “Questions to Ponder.” They are meant to be thought-provoking and fun to work on. Some foreshadow information that comes later in the book. Others are of a philosophical nature or point to deeper mathematical issues. Some are open-ended and do not have cut-and-dried answers. Not all of these questions will interest everyone, but you are encouraged to “play” with those that interest you. Try to think up questions of your own. Mathematics invites exploration.

Do not be discouraged if your progress through the book seems slow. A few pages of text may represent quite a bit of mathematics. Remember, if you are using the book correctly, what is printed here is only a small fraction of the mathematics that is actually being done. The rest is being supplied by you.

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