

How to Read Your Calculus Textbook

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Your success in this course will depend on how you study from your class notes and the text. Reading a calculus textbook is different from any other reading you've ever done. A calculus text is a peculiar blend of encyclopedia, dictionary, atlas, anthology, newspaper, shop manual, nonfiction work, and novel. It's tempting to read a calculus text backward: here's exercise 212(k) on page 1257, so go find something similar in the section. While that approach may have served you well through algebra and trigonometry, calculus is different. Ideally, a calculus text should be read in *all* directions: left to right, top to bottom, back to front, and even front to back. You should read, study, think about, puzzle over, reread, underline, argue about, highlight, and finally, understand your text. That's a tall order. How will you cope? Here are some of my suggestions to help you.

1. **Set your expectations.** It's likely to take more than one reading of a given passage before you understand the ideas involved.
2. **Read the narrative.** Each section is designed to be read from beginning to end. The examples, in particular, are supposed to illustrate ideas and make them concrete, not just serve as templates for homework problems.
3. **Read the examples.** Examples are often the most important parts of the section. Sometimes they show ideas in action, other times they set the stage for new ideas.
4. **Read the pictures,** they are definitely *not* decorations. Pictures are everywhere, even in the middle of sentences. Graphs are an important part of the language of calculus. In fact, I think that the ability to visualize mathematical ideas is the most important thing calculus can teach you.
5. **Read with calculator and pencil.** Try to fill in any missing details you encounter in the algebraic steps, and sketch any diagram that seems appropriate. Use your calculator freely to explore and investigate ideas as they occur to you. Mastering mathematical ideas takes more than reading; it takes doing, drawing, and thinking.
6. **Read the language.** Calculus relies on careful use of technical language, so study the definitions carefully to see the exact meaning of the terms. Understanding the words goes a long way toward understanding the mathematics they convey; misunderstanding them leads to confusion.
7. **Read the instructor's preface (if you like).** It's the author talking about the text.
8. **Read with a partner.** I strongly recommend that you study with a partner or in a group. It often happens that others understand ideas that elude you, and vice versa.
9. **Don't get discouraged if it seems impossible.** One good thing about a calculus text is that it is logical and complete: all the information is there, it's just a matter of figuring it out.

When to Read a Section

You will understand far more if you read the relevant section of the text before we discuss it in class. It doesn't have to be crystal clear to you then, just try to get a framework for understanding set up in your brain. In class, it's much easier to fill in a framework than to construct one from scratch. Many students start by trying their homework problems and only read the text if they get stuck. It's far better to read and understand a section of the text before attempting the exercises. Try it.

How to Write a Calculus Solution

Part of the aim of this course is to train you to think logically. Learn to write the solutions of the exercises in a connected, step-by-step fashion with explanatory words and symbols -- not just a string of disconnected equations or formulas. I will often ask you to state a "conclusion" to a problem. You should be able to compose a complete sentence that reveals your understanding of both the problem and the solution. Unfortunately, some students try to learn calculus as though it were simply a collection of new formulas. When students reduce calculus to memorization, they miss a great deal of understanding, self-confidence, and satisfaction. Further, a student who tries to memorize his or her way through calculus will not be able to compose a good "conclusion."

I thought this was really insightful, so I've printed a copy for you!