# the Little GIANTS math book

*a guide to success in a college mathematics class*

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# Preface.

STUDYING MATHEMATICS is hard. Studying mathematics in college is *really* hard. The material is difficult, and the pace in class is often brutal. To add insult to injury, the grades in a college mathematics class are generally quite a bit lower than they are in many classes in other departments. Sounds overhelming, doesn't it? Well it is; unless you know how to study for a college mathematics course. And that's what this little book is for—to give you tips about how to do well in a college mathematics course. Most of these tips, evident as they may seem, are rarely made known to mathematics students until it is too late. So please read this book—which might well have been titled *How to do well in mathematics, the untold story*—before it's too late. But remember, the road to success in a college mathematics course, as in most serious endeavors, is paved with hard work. This book is loaded with good advice, but the lion's share of the work is yours. So too are the rewards.

There is no royal road to geometry.
*–Alexander the Great's tutor*

# Contents.

# Part one-

# the basics

# Work.

YOUR PROFESSOR will not cover in class all the topics he expects you to know. And those he does cover, you won't be able to learn well by simply attending class. You'll have to spend *a lot* of time outside of class learning the mathematics your professor will hold you responsible for. This is vastly different from the way it works in high school, and even from the way it works in some classes in college. In a high school mathematics class, you generally learned most of what you were expected to know in class. The homework was more or less routine, and often completed during class! Learning mathematics in college is vastly different from this. Most of your learning takes place outside of class. This is so important it bears repeating: *most of your learning takes place outside of class.* Resign yourself to the fact that you must work hard to learn the mathematics and do well in the class. And then dedicate yourself to doing so. No one can make you learn. You must decide to learn, and then do it, yourself.

Genius is ninety-nine percent perspiration,
one percent inspiration.
*-Thomas Edison*

# Read.

IN YOUR HIGH school mathematics classes—and maybe in some of your college classes in other departments—you probably didn't read the text. You came to class, took notes, did the homework problems, and all was well with the world. At least all was well with class. *This strategy won't work in a college mathematics class. You must read the text!* And your class notes. Here's the outline of a basic plan: read each section in the text. Twice. Once before the section is covered in class. This reading can be very relaxed, almost a scanning or a survey. The next day in class, the new ideas your professor presents won't be as intimidating to you. You'll have a jump on things. Then, after class, before you start the homework problems, read the section again. Carefully this time. Mark up the text. Highlight the important stuff—definitions, theorems, major techiniques, and so on. Read, read, and read until you have a clear sense of what the section is about. Then, and only then, start the homework problems.

Human society, the world, man in his entirety, is contained in the alphabet.
*–Victor Hugo*

# Think.

As odd as it may seem, it doesn't occur to most students to *think* about the mathematics that they are learning. Sure, go to class. Sure, do the homework. And now that you own this book, sure, read the text (before doing the homework!). But don't stop there. Think about the mathematics that you are learning. This doesn't have to be a grand philosophical production. Just a simple mental exercise when you have a few minutes. Ask yourself, "Can I state all major ideas (theorems, definitions and approaches to problems) from the chapter?" Think about it. And then do it! Recall what you've learned. Recite all major ideas (theorems, definitions and approaches to problems) from the chapter. Chew on them. You can do this—think about mathematics—anywhere. In line at the cafeteria. On the bus. In your car. Or better yet, go for a walk, away from distractions and think about mathematics.

To live a good life in the
contemplation of great things
*–Bertrand Russell*

# Part two-

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# ics

# Class.

COME TO CLASS! Everyday. Take good notes. Listen carefully. Don't chatter with your neigbor. Don't listen to your walkman. Don't write letters or play your game boy. Pay attention to your professor and your classmates—at least to the ones who are participating in the class. Ask questions. Answer questions when you can. Sit in a place where you can see the board (or the overhead). Don't sit by your friends, if they distract you. Don't sit near your enemies if they distract you! The day is long. Class is short. Muster your energy for the one hour of class time and concentrate!

Sittin' in the classroom,
thinkin' it's a drag.
-*Smokin' in the Boy's Room,*
*Brownsville Station*

# Talk.

THE ANCIENT Greeks had a word that captured the spirit of learning and knowing by talking. The word is *logos*. Exercise your logos! Talk about the mathematics you are learning. To your classmates. To your professor. To the bus driver. To yourself. If you know the mathematics, you can talk about it. Talking about what you're learning will help you figure out what you know (you'll be able to talk about it), and what you don't know (you won't be able to talk about). This will help you focus your attention on studying the things you don't know well, and shore up your understanding of the things you do know.

You talk too much.
*–George Thorougood*

# Help.

MOST STUDENTS who do poorly in a college mathematics class could improve their grade markedly if they simply sought help when they need it. So it's as simple as this: *if you need help, get it!* There's plenty available. See your professor in his or her office hours. Get a tutor. Attend the group tutorial or recitation for the course. Get help from other students in the class. Get help at the student services/tutorial office on your campus. Again, if you need help, get it!

A good man knows his limitations.
–*Clint Eastwood as Dirty Harry*

# Part three-

# exams

# Studying for exams.

IF YOU FOLLOW the tips outlined in the earlier part of this little book, a large part of studying for exams has already been done. In addition to the obvious considerations—get a good night's sleep, study hard, etc.—here are a few more tips—to help you fine tune your exam preparations:

- Use the chapter reviews (both problems and summaries) to test yourself. Do you know what you're supposed to know?
- Do as many homework problems as you possibly can.
- Do you know the statements of all of the important ideas (see "Think" chapter)?

Thy repeath what thy sow.

# Taking exams.

TAKING A MATHEMATICS exam is stressful. In addition to the obvious stress-reducing considerations—sit in a comfortable desk away from distractions, bring extra pencils, etc.— here's a basic exam-taking strategy that will help you focus your energies during the exam in a clear and directed way:

- First, do problems that are easy or obvious to you.
- Next, do the hard ones. At least try them. Try not to leave any problems blank. Not only will you probably get some partial credit for trying them, more importantly, you will get insights into how to solve the problem. Very rarely do answers to difficult, multiple step problems, simply make themselves apparent. You solve them step by step. You work them out. This means you have to take a first step. Write *something*.
- Finally, with any extra time you have, go back and check your answers. Don't turn in your exam early. Use all of the time allotted to you.

> It is a tale told by an idiot, full of sound and fury, signifying nothing
> –*William Shakespeare, Macbeth*

# Learn from exams.

REGARDLESS OF HOW you do on your exams, learn from them. This is an especially good idea in college mathematics class, since finals tend to be cumulative. So even if your score on an exam is less than stellar, learn from it and use it to help you prepare for the final exam. Retake the exam on your own. Take as much time as you need. Use the text, your notes (your classmates, your professor) only if you absolutely have to. But *retake the exam!* Carefully. Until you understand everything on it. Until you've learned from it.

To the victor go the spoils.

# Summary.

Work hard outside of class.

Read the text twice, everyday.

Do homework *after* you've read the section.

Think about the mathematics you're learning.

Get help if you need it.

Come to class everyday.

Talk — excersice you logos

Study for exams—follow a plan.

Take exams carefully—employ a strategy.

Learn from your exams—think ahead.