

# How to Study Math at Bates

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## Introduction

Congratulations! You have decided to study mathematics while you are here at Bates. Studying math in college can often be very different from what you experienced in high school and this guide is designed to help you learn how to approach mathematics while you are at Bates. As you advance in mathematics, the focus changes from mastering techniques to solve problems to focusing on a deep understanding of abstract concepts. So whether you are a math pro or a reluctant mathie, this is for you. Keep in mind, that some of this may be familiar to you and some may not, so you are encouraged to look through and skip around as needed.

## Getting Started: The Syllabus: What Is It?

Your professor will have a syllabus link on their Lyceum page. This page is **VERY** important because that is where you will find all of the class information. This will include information about your professor: their name, their office hours, their philosophy. It will include specifics about your course: textbook, additional materials, grading policy, and sometimes a course outline with anticipated due dates. It will also include course expectations: homework, group-work and attendance policies, requirements for tests and exams. You should not only read this page, but it is a good idea to print it out and keep a copy in your notebook or textbook.

## How Important is Class?

Very! Your professor has spent years honing their craft; developing examples and reworking exposition to deliver the best possible explanations they can. Their goal is to not only get you thinking about mathematical ideas but to get you excited about them as well. In class, you learn which ideas your professor considers to be the most important. Class is also the perfect setting in which to ask questions. No professor has ever complained that their students ask too many questions, so if you are confused, ASK! Chances are there are several other students wondering the same thing. Don't be a passive learner; engage in class discussion. You will enjoy your class more and improve your understanding.

## Do I need to take notes?

YES! It is tempting to rely on pre-printed notes from the professor, or just your textbook, but you should plan on taking notes in class. The physical act of writing helps to reinforce the material in your brain as you learn new concepts. Sometime between class and homework, read back through your notes. If they are messy, rewrite them. This is not a waste of time; rewriting your notes lets you review the material and recognize any gaps in your understanding. As you re-read your notes, write down questions that arise in the margins. Bring those questions to class, to office hours or to the Math/Stats Workshop to get them answered. Your notes do you no good if you can't understand them!

## Do I need to read the textbook?

Yes!! Math textbooks can be notoriously difficult to read, but that shouldn't be your excuse for not doing so. Start by taking note of the definitions. Put these in your notes. Your professor will likely review the definition in class, so then you can annotate your notes with any clarifications. Write down the theorems, employing the same method. On your first read through, look at the proofs, but don't worry about them too

much. After your class on the material, go back to your textbook and re-read. If your class is a proof-based class, look at the proofs and try to follow them, jotting down any questions you have. Pay close attention to the examples!! These will help you in doing your homework. If your textbook offers practice problems with solutions at the end of the section or chapter, do those (without looking at the answer first!!) and then check your answer. Your textbook is a resource - take advantage of it!!

## How do I take notes?

Taking notes is extremely important in a math class. Whenever possible, the best approach is to review the material once BEFORE class. Don't expect to understand everything - the idea is just to prime your brain. Write down any theorems and definitions from the section which you will be covering, leaving lots of space around. Then, once you get to class, rather than spending time re-copying theorems, annotate what you already have written down.

**Example:**

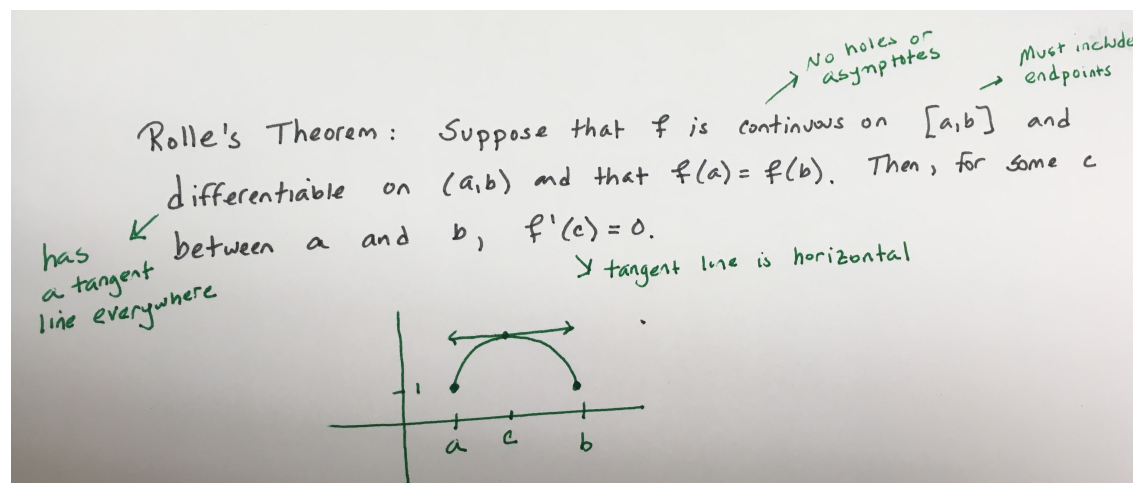


Figure 1: Annotation of Rolle's Theorem

You need to find the balance between listening and writing. Not everything written on the board needs to be in your notes, nor does everything your professor says, but in each case there are going to be important points you want to write down. Using different colors can help you to quickly spot salient information from class. Or, try writing the examples in a different color from the rest of your notes. That makes it easier to find them when you go back to look. If your professor is writing down a definition or theorem that is in your book, make a note of the theorem number, but then just write notes for yourself about the theorem, rather than copying it down. Pay attention to the words in the theorem; you should not only try to understand every word, but you should also understand why the conditions of the theorem are required. Again, after class, re-read your notes and rewrite them as necessary. Jot down any questions in the margins and make sure you get them answered in class, in office hours, or in the Math/Stats Workshop.

## Homework: I used to be good at math. What happened?

Rest assured - this feeling is normal. Don't be surprised if you can't solve every problem right away. Your professors want you to have to think about the homework problems - otherwise they are just giving you busy work. Always give yourself multiple chances to do your homework; look it over a day or two after it is assigned and do what you can. Try every problem, but if you are really stuck on a problem, leave it and let your brain work on it while you do other things. Then, later that day or a little later in the week, try again. Follow the hints that your professors sometimes give you; even if you don't see how their suggestion will help, trust them! They are looking to help you!

You may be used to working alone on math - now is the time to change that! Math is a subject that needs to be wrangled with and discussed. Find a group to work with!! Don't know anyone in your class? Come down to the Math/Stats Workshop and we can help to connect you with other people doing the same work. Even if you think that you work better alone, I would encourage you to work with other people. Talking about material helps to clarify it. Remember that the point of doing homework is to aid in your

understanding of the material - don't approach homework as just "something to be completed." The more practice you do, the better you will understand the concepts being studied.

When you do go to get help (which we hope you do!), go prepared with questions for the tutors; *e.g. How do I start this? How do I recognize which technique to use? What exactly is this question asking?* You want the tutors to give you a nudge and help YOU to work through it. Don't be tempted by the false glamour of completion - make sure you have really understood the problem when you leave!

## Office Hours: Are they for me?

YES!! All of your professors hold office hours, and YES, they want to have you come. Office hours are a chance for you to ask questions one-on-one. This is an opportunity to clarify your notes, to ask for help with a particular problem, or to just talk through a concept you have not quite understood. It can feel intimidating the first time you go to see your professor, but once you do, you will realize that they are invested in your success. Sure, professors expect you to work hard, but they also want you to understand the material and be successful in their course. Professors take pride in seeing their students master concepts and develop their analytic skills. Sometimes, especially if students are already feeling insecure with the material, they express the fear that if they attend office hours the professor will: "find me out!" "Discover that I have no idea what I am doing." "Tell me I don't belong at Bates." Professors are here because they believe in education which means they believe in YOU. If you are trying, then their goal is to support you, not judge you.

## Exams: How do I Prepare?

The purpose of exams is to insure that you have a thorough understanding of the concepts you have covered in class. Begin by reading through your notes - do you have anything written down that doesn't make sense to you? Go to office hours or the Math/Stats Workshop and get your questions answered. Once you feel confident that your notes at least make sense, do practice problems. The best way to study math is to DO math, so reserve some time each day for a week before your exam to do a few problems. You might be thinking to yourself "That's crazy! I have other classes!" But, 30 minutes - 1 hour for four days is MUCH more effective than 4 hours of studying crammed into one day.

## Can I really talk to my professors?

When I was in college, I was too scared to talk with my professors. Now, as an adult who has spent a long time in the educational world, I regret the lost opportunity. Your professors are at Bates because they like working with students. That means YOU! So, yes, you can really talk with your professors - they are people too. You don't need to try to impress them, nor even just talk with them about math. Math lunch is a great time to get to know your professors in an informal setting.

## What resources are available to me?

In addition to your professors' office hours, the Math and Statistics Workshop, located on the ground floor of Ladd Library, is an excellent resource available to you. The MSW is staffed with peer tutors who have taken those same courses, and you can also make individual appointments with [Grace](#) and [Andee](#). In addition, we have additional printed and online resources to enhance your understanding of the material.

*With special thanks to Matthew Saltzman and Marie Coffin, Department of Mathematical Sciences, Clemson University. Please see their guide, [How to Survive Your College Math Class](#) for additional information.*