



About Math 1b

The goal of Math 1b is to provide you with a deep understanding of topics calculus as well as a strong sense of how useful mathematics can be and how you can apply mathematics in your work and studies. Our aim is to provide you with a solid set of mathematical skills and a high degree of mathematical confidence when you finish the course so that you will be well-equipped for future studies in mathematics, biology, chemistry, economics, or other disciplines. To help you achieve these goals, we will use multiple approaches to problem solving, and we will stress understanding the ideas behind the mathematical formulas and techniques that you will learn.

Course Head

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- * Office Hours: Tuesdays at 2-3 PM, Wednesdays at 6-7 PM, Thursdays at 4-5 PM

Course Web Site

<http://www.courses.fas.harvard.edu/~math1b/>

Course Goals

- * To gain an appreciation of the conceptual structure of functions and calculus and differential equations.
- * To acquire a foundation of mathematical concepts needed in the natural and social sciences and to see how mathematics is influential in other disciplines.
- * To gain an appreciation of the role of mathematics in the modern world.
- * To gain some measure of the mathematical way of approaching and viewing the modern world.
- * To develop skills in numerical and symbolic computation, mathematical reasoning, and mathematical modeling.
- * To gain skills in learning and communicating mathematics.

Learning Objectives

Upon successfully completing Math 1b, you should have acquired a solid foundation of the following topics and be able to move directly into Mathematical Modeling (Math 19), Introduction to Linear Al-

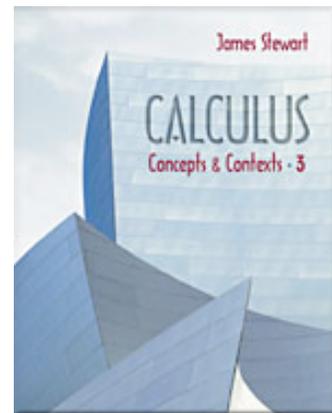
gebra and Multivariable Calculus (Math 20) or multivariable calculus (Math 21a) depending on your interests.

- * Integration and Applications of the Definite Integral – Techniques of integration, numerical integration, areas, volumes, arc length, applications to the natural sciences and economics.
- * Infinite Sequences and Series – sequences, series, testing for convergence, power series, and Taylor series.
- * Differential Equations – Modeling, differential equations from a numerical, an analytical, and a geometrical approach, systems of differential equations

Textbooks

The textbook for this course is

- * James Stewart. Single Variable Calculus: Concepts & Context, third edition. Brooks/Cole, Belmont CA, 2005. ISBN 0-534-41022-7.



If you are plan to take Math 21a at some future date, you may want to consider purchasing the edition of the textbook that covers both single and multivariable calculus (ISBN 0-534-40986-5).

Calculators

A graphing calculator will be a tremendous asset in this course. We encourage you to bring your calculator to class with you everyday.

If you are purchasing a calculator, we recommend a Texas Instruments TI-84, TI-86 or TI-89 calculator.

With the advent of graphing calculators and mathematical software programs, it is now possible to do an amazing number of things almost instantaneously that would otherwise take hours or days to do by hand. Calculators can help you with your math skills and instincts by reducing the time you spend doing burdensome computations.

However, you should not rely on computers and calculators to such an extent that they keep you from developing your own skills. Technology should be used as an aid, but without a good understanding of the underlying mathematical concepts, the calculator will quite happily mislead you without your even knowing it. In general, technology is a good thing, but as with everything, sometimes too much of a good thing can lead to problems. *For this reason, we generally do not allow calculators to be used on exams.*

Grading and Exams

Your course grade will be determined as follows:

Component	Date	Percentage
Homework	-	20%
Techniques Exam	Wednesday, February 22 at 6-7 PM PM in Science B Tuesday, February 28 at 8-9 PM in Science B (Re-Test)	10%
Midterm I	Tuesday, March 14, 2006 at 7-9 PM PM in Science B	20%
Midterm II	Tuesday, April 18, 2006 at 7-9 PM PM in Science B	20%
Final Exam	Tuesday, May 23, 2006	30%

You need only take the techniques of integration exam one time. If you choose to take this exam a second time, we will count the higher of your two scores. Semester numerical scores will be converted into letter grades according to the following method.

Range of Numerical Values	Corresponding Letter Grade
100 - 90	A
89 - 80	B
79 - 65	C
64 - 50	D
49 - 0	E

When we calculate your final grade at the end of the course, we will calculate a score on a 0-100 point

scale using the scores that you have obtained during the course, and using the grade breakdown given above. Your course grade will then be obtained using this table. In the event of a fractional score, we will always round up to the nearest integer. We may modify these letter grades with a "+" or a "-" if we believe that your performance in the course warrants this.

Exam Policy

Midterm exams are scheduled far in advance, and it is impossible to move the time or date. However, in rare cases where it is impossible for an individual to take the exam at the scheduled time, we will work with you to make other arrangements. Exceptions for taking the exam out of sequence are the following:

1. A medical excuse. Please have your senior tutor or freshman dean contact us.
2. A University sponsored event such as an athletic tournament, a play, or a musical performance. Your coach or director must contact us in advance. Athletic practices and rehearsals do not fall into this category.
3. A religious holiday. Please send a short email explaining the situation.
4. Extreme hardship such as a family emergency. Please have your senior tutor or freshman dean contact us.
5. A class conflict. Please send us your complete schedule. Labs or sections that can be re-scheduled do not fall into this category.

The above are the only allowable excuses for taking the exam before the scheduled time. Under no circumstances do we give late exams. Since we can only accommodate a limited number of students taking the exam at an earlier time, please make sure that you fall into one of the above categories before you contact us. If you miss an exam due to illness or a family emergency, you will not be penalized. We will assign you a grade based on the rest of your coursework. If you have a conflict with the final exam, you must contact the Registrar. Only the Final Exams Office can schedule an out-of-sequence final exam.

Homework

There is no question that the best way to learn math is by doing math, and homework exercises are an essential part of any math course. If you just go to a math class and watch the teacher work problems, but do not actually try doing any problems on your own, then there is very little chance you will really learn the subject. It is also very unlikely that you will do well on exams without working through homework problems ahead of time. While doing homework, do not just write down answers. Think about the problems posed, your strategies, the meaning of your computations, and the answers you get. The main point is not to come up with specific answers to the specific problems you are working on, but to develop an understanding of what you are doing so that you can apply your reasoning to a wide range of similar situations. It is very unlikely that later on in life you will see exactly the same math problems you are working on now, so learn the material in such a way that you are prepared to

use your general knowledge of mathematics in the future, not just how to apply particular formulas for very specific problems.

You are encouraged to form study groups with other students in the class so that you can discuss your work with each other; however, all work submitted must be written up individually. Make sure that even if you do work in groups, that you come away with the ability to explain everything you end up writing up in your homework.

There will generally be two or three problem sets due each week. Assignments will be graded by your course assistant and will typically be returned to you at the following class meeting. We will then post solutions to the homework on the course website. Check the solutions so that you can learn from your work. In order for us to post solutions as soon as possible, and in light of the fact that getting behind in a math class is one of the most uncomfortable things you can do to yourself, homework must be turned in on time. Since we will drop your 3 lowest homework grades, please do not try to harass your course assistant into accepting a late homework assignment.

Pre-Reading Exercises and Pre-Class Surveys

There will be times when problems for homework will look different from what is discussed in class. For most classes we will ask you to read through a section ahead of time so that when you then see it covered in class, you will be able to follow along much more easily (as opposed to seeing the material for the very first time in class). As an incentive to do this pre-reading, we will ask you to do one or two very straightforward questions from that section for homework, even though the material has not been covered yet in class. These pre-reading problems will be marked with a "*" and will be graded differently than other homework problems. You will usually receive full credit for a pre-reading problem if you have made a good effort and some progress toward the solution.

You will also be asked to fill out a very short on-line pre-class survey before each class. The survey will ask you what you found interesting or troublesome about the material that you were asked to read before class. The pre-class surveys are designed to help your TF address your concerns or interests during the next day's class. To fill out a pre-class survey, simply go to the Q & A Tool and click on the appropriate survey. You will have until midnight of the day before your class to fill out your survey. Pre-class surveys will count as 5% of your total homework grade.

Classes and Problem Sessions

Math 1b is taught in small classes rather than in a large lecture so that you will have a better opportunity to ask questions and interact with your teacher. Make sure you take advantage of this arrangement. Any questions you ask in class will likely be ones that other students will want answered as well, so get over any hesitation you might have and ask questions as the material is presented. You will not be penalized for doing this, no matter how trivial or simple you think your questions might seem. Remember, the class is being held for you to learn the material, not just to give you a time to copy notes off of a blackboard, so be sure to get help when you need it and stay involved in your class.

You will also be attending problem sessions led by the Course Assistant. The problem sessions are an important part of the course. Problems sessions will be devoted mainly to working problems and reviewing material. Even if you find you are not having difficulty doing the homework problems, you should still make a habit of attending these sessions.

Getting Help with Math 1b

There are multiple resources available if you are looking for some assistance with mathematics. The Math Question Center (MQC), is a place that you can drop by to work on or ask questions about your math homework. It is staffed by Course Assistants and Graduate Students (you can recognize them, since they're the ones wearing Hawaiian leis!) who are available to help you as you do your homework. The MQC is also a great place to meet and work with other people in your course. The center is typically open from 8 to 10 PM on Sundays through Thursdays.

Each section of Math 1b has an undergraduate course assistant who teaches a problem session each week. The problem sessions are dedicated to explaining material that was covered in class and are another excellent place to get help with your homework. You can find a schedule of the CA led problem sessions on the Sections web page. The Sections web page is also the place where you can find out about TF office hours. Remember that you don't have to make an appointment to see your TF during office hours. All you have to do is show up. They will be happy to help you with any questions that you might have.