

Calculus I (Math 113)

Fall 2010

1 Technicalities

Instructor: Clay Shonkwiler (cshonkwi@haverford.edu)

Office: KINSC H213

Course web page: <http://www.haverford.edu/math/cshonkwi/teaching/m113f10/> and Blackboard

Text: *Single Variable Calculus: Early Transcendentals* (6th edition), by James Stewart

Office Hours: Tentatively Monday 1:30–2:30, Wednesday 3:00–5:00 and Thursday 1:00–2:00. Also, the Math Question Center is open Sunday–Thursday from 7:00–9:00 in KINSC H011; this is a good place to discuss questions with other students, supervised by faculty.

2 Summary of the Course

This course provides an introduction to single variable calculus. You will develop a deep understanding of the three most important concepts of the calculus: limits, derivatives, and integrals. Limits allow us to understand the behavior of a function as its inputs approach some specified value and provide the foundation for the other two concepts. Derivatives arise as slopes of tangent lines, rates of change, and linear approximations. Integrals provide a way of finding the area under a curve and the total change of a rate of change.

You should understand each of these concepts theoretically, geometrically, and heuristically and be able to compute effectively enough to apply them appropriately. In order to do so you will need to develop your abilities to think mathematically and communicate effectively.

3 Homework

There will be weekly homework assignments, typically due Thursday at 3:00 PM. Homework is an important part of any math class, as it is impossible to *learn* mathematics without actually *doing* mathematics. The goal of the assignments is to deepen your understanding of the concepts, tools and techniques discussed in class, as well as to give you the opportunity to practice explaining your mathematical thinking. The importance of effective communication is vital: knowledge without the ability to communicate that knowledge is of limited value. As such, to get full credit on a problem your solution must be clear and well-written.

Homework must be stapled with your name clearly written at the top. What you turn in should be a final copy: it should be neat, legible, and well-organized. If I can't read or understand your work you won't receive any credit.

Late homework will not be accepted, so you should turn in whatever you have completed on the due date in order to get credit for it. Your lowest homework grade will be dropped from the calculation of your final grade.

Collaboration on homework is not only allowed, it is highly encouraged. The process of doing mathematics is a strange mixture of the social and the antisocial: it is often the case that you will understand a problem and its solution better when you discuss it with someone else, but it

is also essential that you work through the details on your own so that you don't use another's understanding as a crutch. As such, you should follow these guidelines when collaborating:

- You must work on each problem on your own before discussing it with your collaborators.
- When discussing a problem with your collaborators (or with me), you should work on a white board, a blackboard, or a colored sheet of paper. *You should work in groups of no more than 4 at a time*; in larger groups it is virtually impossible for everybody to contribute to the discussion and develop their own understanding of the problem.
- You should write up your solution separately from your collaborators and without reference to the white board, blackboard, or colored sheets of paper containing your joint work so as to communicate your own understanding of the problem. If you cannot write up your solution without referring to your collaboration materials, then you probably have not understood the problem and should throw away your solution, work further on your own, and re-start the collaborative process.
- You must indicate with whom you collaborated on your homework. Who you work with may change from problem to problem, so please note your collaborators separately for each problem.

Online or other outside resources are not allowed unless you have received my permission ahead of time.

Please contact me if you have any questions; you may also want to refer to the math department's guidelines on collaboration (<http://www.haverford.edu/math/collaboration.html>).

4 Exams:

There will be three midterm exams and a final. The midterms will be one-hour in-class exams and are tentatively scheduled for October 1, November 5, and December 3. The final will take place during the finals period and will be a two-hour self-scheduled exam. All exams are closed-book, though you are welcome to prepare one $8\frac{1}{2}'' \times 11''$ sheet of hand-written notes for use during each exam. Collaboration is not allowed on any of the exams.

5 Grading

Your final grade in the course will be determined by:

Homework: 15% (lowest dropped)

Midterms: 20% each

Final: 25%

6 Additional help

If I were a perfect teacher, you could learn everything you need to know just by going to class. Unfortunately, I am not a perfect teacher, so there's a good chance that, at some point, you'll find yourself confused, stuck or otherwise frustrated by the material or the course. If you do, ask for help! Office hours are, of course, an excellent venue for this, but if you feel uncomfortable asking

my help or if you find that my teaching style and your learning style simply don't mesh, there are many other resources available to you.

First and foremost, your fellow classmates are a great resource. Odds are that, for any question you have, there's someone in the class who can answer it, so don't be afraid to ask. Even the simple process of explaining why you're stuck to someone who is just as confused as you is often enough to make things clearer. Just be sure to return the favor when you get the chance to help someone else.

Second, the Math Question Center is open Sunday–Thursday from 7:00–9:00 in KINSC H011 and is a great place to ask questions of your fellow students, of math majors or of professors.

Third, Haverford's Office of Academic Resources coordinates peer tutoring, which is available to you in unlimited quantities free of charge. To connect with a tutor, visit the Peer Tutoring website: <https://www.admin.haverford.edu/deans/tutoring/tutor.html>

If none of the above is suitable or practical, please let me know and I'll be happy to help you find additional resources.

7 Accommodations

If you think you may need accommodations in this course due to the impact of a disability please meet with me privately as soon as possible. You should also contact Rick Webb, Coordinator, Office of Disabilities Services (rwebb@haverford.edu, 610-896-1290) to confirm your eligibility for appropriate accommodations. Doing so early in the semester will help prevent unnecessary inconvenience.

8 Anticipated Schedule

Week	Subjects (Sections from the text)
08.30–09.03	Functions (1.1–1.4)
09.06–09.10	Special functions, tangent & velocity problems (1.5–2.1)
09.13–09.17	Limits (2.2–2.4)
09.20–09.24	Continuity, derivatives (2.5–2.7)
09.27–10.01	Derivatives as functions (2.8), Midterm
10.04–10.08	Derivatives of simple functions, product & quotient rules (3.1–3.3)
10.11–10.15	FALL BREAK
10.18–10.22	Chain Rule, implicit differentiation (3.4–3.6)
10.25–10.30	Rates of change, exponential growth, related rates (3.7–3.9)
11.01–11.05	Linear Approximations (3.10), Midterm
11.08–11.12	Extreme and mean values (4.1–4.3)
11.15–11.19	L'Hôpital's Rule and applications of derivatives (4.4–4.7)
11.22–11.26	Newton's method, antiderivatives (4.8–4.9)
11.29–12.03	Areas and distances (5.1), Midterm
12.06–12.10	The definite integral and the Fundamental Theorem of Calculus (5.2–5.3)