

# Math 103, Introduction to Calculus

## Fall 2014

### Course Information

<b>Professor:</b>	Henry Towsner
<b>E-mail:</b>	htowsner@math.upenn.edu
<b>Office:</b>	DRL 4N51 David Rittenhouse Laboratories, 4th floor, North wing
<b>Midterm Exams:</b>	9/24, 10/22, and 11/19 from 6:00pm-7:30pm in DRL A1
<b>Final Exam:</b>	December 12 from 9:00am-11:00 am (location TBA)

### Textbook

Thomas' Calculus, Second Custom Edition for the University of Pennsylvania (with MyMathLab access code!). Pearson. ISBN 10: 1-269-96229-9 ISBN 13: 978-1-269-96229-2. It must be bought in the University bookstore (this same text is used in Math 104 and Math 114). Don't buy the non-custom Penn version of the text because it won't be bundled with the access code to MyMathLab.

### MyMathLab

We will be using the MyMathLab website for portions of the homework in this class. Since there will be homework assignments soon, you should make sure you can log in without any trouble as soon as possible. You can go to <http://www.pearsonmylabandmastering.com/> to create an account; you will need the course code, which is `towsner20606`. Detailed instructions are on the class Canvas site.

If you don't have an access code yet, you can request a temporary code which will give you access to the course for 17 days. (If you can't figure out how, contact the professor for assistance.) Whether or not you have an access code, make sure to get registered as soon as possible!

### Exams

There are three scheduled evening midterm exams, on Wednesday 9/24, 10/22, and 11/19. The exams will be one and a half hours long (from 6:00pm-7:30pm). If you have a scheduling conflict, let us know ASAP and no later than September 12th.

### Grading

- **10% Attendance/participation:** Half of this is just for showing up. The other half will be awarded as long as you are not overly distracted or tuned out.
- **15% Pre-class preparation:** This is for doing the pre-class preparation, including reading the textbook, doing pre-class problems, and participating in the online discussion.

- **5% Homework:** This is for doing the post-class homework.
- **10% Recitation Quiz:** This is for the quiz which will be given in recitation after you've finished the homework on a topic.
- **40% Midterms:** There will be three evening midterm exams.
- **20% Final exam:** The final exam will be held at the time designated by the registrar.
- **0% Gateway Exams:** There are two pass/fail "gateway exams". It is necessary to pass them to pass the class, but they do not otherwise affect your grade.

## Calculators

Calculators will *not* be permitted on any quiz or exam. Calculators are permitted while working on worksheets, but are not required.

## Special Accommodations

The Office of Student Disabilities Service (SDS) is part of the Weingarten Learning Resources Center. It provides accommodated exams and assistive technology (along with many other services) to students that self-identify in compliance with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Please see their website ( [http://www.vpul.upenn.edu/lrc/sds/current\\_students.php](http://www.vpul.upenn.edu/lrc/sds/current_students.php) ) for more information. If you expect to receive an accommodation, you are encouraged to contact me and SDS as soon as possible, and within the first two weeks of the course.

## Code of Academic Integrity

The following is from the University's website on academic integrity "Since the University is an academic community, its fundamental purpose is the pursuit of knowledge. Essential to the success of this educational mission is a commitment to the principles of academic integrity. Every member of the University community is responsible for upholding the highest standards of honesty at all times. Students, as members of the community, are also responsible for adhering to the principles and spirit of the following Code of Academic Integrity found here [http://www.upenn.edu/academicintegrity/ai\\_codeofacademicintegrity.html](http://www.upenn.edu/academicintegrity/ai_codeofacademicintegrity.html) If a student is unsure whether his action(s) constitute a violation of the Code of Academic Integrity, then it is that student's responsibility to consult with the instructor to clarify any ambiguities."

## Course Format

This is an *active learning* course; it may be organized differently than other courses you're used to. The details are in the rest of the course packet, but here's the most important information:

- Lectures take place mostly in videos you'll watch *before* class.
- Class time will mostly be used for group work or class discussions.
- To get the most of the class you should:
  - Come to class prepared.
  - Expect the class work to be challenging, but not impossible. Don't be afraid to try things you're unsure of, and don't be afraid to ask questions.
- It's very important to come to class prepared. That means:
  - Do all the pre-class work, every single time.
  - Have a notebook with your work related to the class, including previous homeworks and group work. Bring it to class every day.
  - Your group as a whole should have access to a copy of the textbook and a graphing calculator, but you don't all need your own. (And the textbook is heavy, so you may not want to all have to drag it with you!)
- At some point in the first week or so of the class, read the whole course packet and watch the videos about how the course works.

## Resources

This is a difficult class. Penn provides many resources to help you succeed in Math 103:

1. If your math skills are rusty, consider attending the *Calculus Start-up Program* on September 2nd or 3rd. Details are at <http://www.vpul.upenn.edu/tutoring/calculusstartup.php>
2. Recitation sections exist to help you learn the material. Make the most of the opportunity: come prepared and ask questions.
3. I hold office hours twice per week (times to be announced). If you are unable to make those times, I can often (time permitting) schedule additional appointments outside of that.
4. Your TAs will also be holding office hours (times to be announced)
5. Starting in a couple weeks, the math department sponsors drop-in help most days. See <http://www.math.upenn.edu/ugrad/calc/help/schedule.html> for the schedule and locations:
  - Mon-Thu 3-7:00 in the Education Commons,
  - Mon-Thu, the rotating through various dorms, 6:30-9:30
6. Learning Resource Center, offered by the Weingarten Learning Resources Center, in Stouffer Commons, Suite 300, 3702 Spruce Street, Philadelphia PA 19104, tel: (215) 573- 9235 <http://www.vpul.upenn.edu/lrc/>.
7. The Tutoring Center <http://www.vpul.upenn.edu/tutoring/index.php>
8. The math department maintains a list of tutors <http://www.math.upenn.edu/ugrad/tutors.html>

# Answers, Solutions, Writing and Simplifying

## Answers

When you answer a question, make sure you're actually answering the question asked. With questions that are just calculations, you're unlikely to make a mistake, but with a word problem, you should always check at the end that you've actually provided the thing the question was asking for.

## Solutions

A complete solution to a mathematics problem is not just a number. It's a complete *explanation* for why that number is the answer. It **does** include the intermediate steps, in a clear and intelligible way. It **does not** include false starts or irrelevant calculations.

Often solving a mathematics problem requires some trial and error, or some false starts, or some mistakes. You might have to do some extra calculations off to the side. That's normal, and it's how we get a first draft of a solution. You should expect that on most problems you will *rewrite* that work to produce your final solution. This is an important part of the process of solving a problem, not only because it creates a record of your work that others can understand, but because it's when *you* go through your work and identify what part of your work was the actual core of the solution. (It's also a great way to catch mistakes.)

What constitutes an explanation depends on your audience. In this class, whenever we write solutions, the audience is *you and your classmates*. Imagine that one of your classmates got a different answer; your solution should convince that student that they made a mistake and your answer is right. (How much do you need to include in intermediate steps? You don't need to include every intermediate step if they're easy to do in their head—after all, you're writing for someone who can probably do the same steps in your head. On the other hand, your classmate apparently isn't quite as good as you—they got a different, presumably wrong, answer—so if you have to think a bit to get from one step to the next, it's probably too much for your classmate.)

## Writing

When problems ask you to write an argument, the same principles apply: you're writing for a classmate who disagrees, and you should give an argument that would be convincing. Remember that you're not writing for some ideal classmate who's memorized the textbook. Your classmate knows the same material you do, but not necessarily exactly as well, and they might have forgotten some things or gotten confused.

## Simplifying

In this class *simplifying is a tool*. We never need to simplify just for the sake of simplifying.  $\frac{1}{\sqrt{2}}$ ,  $\frac{3x}{7y+2}$ ,  $\frac{2xy}{7y^2+2y}$ ,  $6 + \frac{4}{8} + 2$  are perfectly good answers. In fact, I encourage you *not* to simplify unless you have a reason to.

However sometimes, especially in the middle of a problem, we *want* to simplify, because it makes the next step of the problem easier for us. So don't forget that you know how to simplify, and if you see something—especially something ugly—in the middle of a problem, consider simplifying then.

## Reading the Textbook

- **WHEN YOU’LL DO IT:** Before the relevant class period (before or after watching the video lectures)
- **WHEN IT’S DUE:** No later than 12:30pm the day of class (one hour before the start of class), though you have a lot of other things to do after the reading, so you’d better finish it before then.
- **WHAT YOU’LL DO:** Read one or two sections of the textbook, as listed in the Agenda for that day. The textbook is broken into subsections (indicated by the blue headers); sometimes we’ll skip particular subsections. (Of course, it won’t do any harm to read them.)
- **WHAT YOU NEED TO KNOW ABOUT IT:**
  - Reading math textbooks is usually difficult, and ours is no exception. You **shouldn’t** expect to understand everything the first time you read it.
  - You **should** identify things you don’t understand yet and ask questions or come back to them later.
  - You **should** be identifying where important information is so you can look it up when it’s needed.
  - I’ve tried to make longer readings, when we have them, due Tuesdays when there’s a longer gap, but a couple of times it wasn’t possible. Don’t be averse to starting the Thursday reading before Tuesday’s class.
- **WHERE YOU CAN GET HELP:**
  - Each Agenda will remind you to “make sure to identify” certain items. **Don’t** treat this as a scavenger hunt; you should be reading the whole section. Treat this list as a way of checking that you were reading carefully enough: if you read carefully, you should have noticed all of those items on your own. If you’re consistently getting to the end of the reading without taking note of the important items, you’re not reading carefully enough!
  - Definitely ask questions about parts that are confusing on the class discussion forum for that section or on the plenary calculus forum.

## Watching Video Lectures

- **WHEN YOU'LL DO IT:** Before the relevant class period (before or after watching the video lectures)
- **WHEN IT'S DUE:** No later than 12:30pm the day of class (one hour before the start of class), though you have a lot of other things to do after watching, so you'd better finish it before then.
- **WHAT YOU'LL DO:** Watch a few online lectures
- **WHAT YOU NEED TO KNOW ABOUT IT:**
  - There are only a few lectures per class period (always less than 30 minutes of lecture). The goal is to help you work through the pre-class topics so you can come to class prepared.
  - The videos are edited to go pretty quickly, because I don't want to waste your time listening to me pause. They probably go faster than you can take notes. Don't hesitate to pause the video whenever you need to.
  - Take watching videos as seriously as you would going to a lecture. Actually, take it as seriously as you think you should take going to a lecture. Have your notebook out, be sitting up, avoid distractions.
  - The videos don't usually cover the topics we cover during class (when I can talk to you in person). In particular, they don't completely replace the textbook, which you definitely still need to read!
  - Yes, that's really what my handwriting looks like, and that only when I write slowly and carefully. If something's actually illegible, please tell me so I can fix it!
- **WHERE YOU CAN GET HELP:**
  - If something in a lecture is confusing, e-mail me or ask a question in the discussion forum
  - There are lots and lots of calculus lectures online now. Many of them are much nicer than the ones I recorded. If you don't like my explanation of something, or you want to see another example, or an additional topic we don't have a video for, definitely head to your favorite search engine and see if you find one you like better. If you find one that's really good, go ahead and share it with your classmates on the discussion forum.

## Pre-Class Practice Problems

- **WHEN YOU'LL DO THEM:** Before the relevant class period (probably after reading the textbook and watching videos)
- **WHEN THEY'RE DUE:** No later than 12:30pm the day of class (one hour before the start of class), but you should do it before then so that you have time to do the quiz and to ask questions if you get stuck. There will be *absolutely no extensions given*; it's essential that you do the problems before class to be prepared for class.
- **WHAT YOU'LL DO:** Work through roughly ten problems on MyMathLab, our online homework platform.
- **WHAT YOU NEED TO KNOW ABOUT THEM:**
  - You can redo a problem you get wrong as many times as you want by pressing the “Similar Problem” button.
  - Sometimes MyMathLab is a little picky about how answers get formatted. (For instance, it's possible to write  $\cos^2 x$  the “wrong” way, and it will get confused.) If it insists that your answer is wrong even when it isn't, use “Ask My Instructor” to contact me about it; I can see your answer and either explain why it's wrong or force MyMathLab to accept it.
  - Sometimes it's possible to “game” the Similar Problem setup until you can brute force your way through a problem without understanding it. Don't take advantage of that; it won't help you with the rest of the course.
- **WHERE YOU CAN GET HELP:**
  - Most problems have a button called “Help Me Solve This” which will walk you through it step by step, then switch you to a similar problem so you can try it yourself.
  - In most cases there's a similar problem in one of the Examples in the textbook, or that I did in one of the videos.
  - If you get stuck on a problem, use the “Ask My Instructor” button.
  - If you're stuck or confused, come to office hours.
- **HOW IT AFFECTS YOUR GRADE:** 5% of your grade is for doing the pre-class practice problems. Each day's practice problems are worth the same amount. I'll drop the two lowest scores (including zeroes), then weight the rest equally. (If you joined the class late, I'll only start counting from the first class period after you joined.)



## Pre-Class Quiz

- **WHEN YOU'LL DO IT:** Before the relevant class period (probably after doing the pre-class practice problems)
- **WHEN IT'S DUE:** No later than 12:30pm the day of class. There will be *absolutely no extensions given*; it's essential that you do the problems before class to be prepared for class.
- **WHAT YOU'LL DO:** Work through (usually) two or three problems on MyMathLab.
- **WHAT YOU NEED TO KNOW ABOUT IT:**
  - You can retake the quiz as many times as you want.
  - Don't take the quiz a dozen times. If you need more than a few tries, you're time is better spent figuring out what you don't understand (possibly by getting help) than hammering your head against it more times.
  - You can't use "Help Me Solve This" on these.
  - There's a time limit, but it's generous (at least 10 minutes per problem).
  - Sometimes MyMathLab is a little picky about how answers get formatted. (For instance, it's possible to write  $\cos^2 x$  the "wrong" way, and it will get confused.) If it insists that your answer is wrong even when it isn't, use "Ask My Instructor" to contact me about it; I can see your answer and either explain why it's wrong or force MyMathLab to accept it.
  - If you're struggling with a quiz, it's an early warning to get help—from office hours, drop-in hours, or your preferred source—early.
- **WHERE YOU CAN GET HELP:**
  - Go back and look at the Pre-Class Practice Problems. Quiz problems are usually similar to at least one of those.
  - The "Ask My Instructor" button is still there if you have a specific question about what you're doing wrong.
  - If you're really stuck, come to office hours.
- **HOW IT AFFECTS YOUR GRADE:** 5% of your grade is for doing the pre-class quiz. Each quiz is worth the same amount. I'll drop the two lowest scores (including zeroes), then weight the rest equally. (If you joined the class late, I'll only start counting from the first class period after you joined.)

## Participate in the Discussion on Canvas

- **WHEN YOU'LL DO IT:** Before the relevant class period
- **WHEN IT'S DUE:** No later than 12:30pm the day of class (one hour before the start of class). There will be *absolutely no extensions given*; it's essential that you do this to be prepared for class.
- **WHAT YOU'LL DO:** Make a contribution to the discussion on Canvas for that class
- **WHAT YOU NEED TO KNOW ABOUT IT:**
  - A contribution can be a question, an answer to another student's question, an observation (for example, "This topic reminds of the way we did this thing two weeks ago", or, "I found this easier after I realized that..."), or even a link to a helpful resources (for example, "this website has a great explanation" or "I found a video that's way clearer than Professor Towsner's")
  - If you're not sure what else to do, ask a question
  - Do take the time to ask questions clearly and think about your audience. For instance, a common question is to take a new subject and asks what happens in a weird case; regarding Section 1.1, someone might ask "What happens in a piecewise defined function if the intervals for the parts overlap?" Remember that the first part of the question is important: if you just ask "What if the intervals overlap?" then we have to guess which topic you're thinking about.
- **WHERE YOU CAN GET HELP:**
  - If you can't think of a way to participate in the discussion, you're overthinking it. Read the relevant section of textbook until you find something you don't understand, then ask about it. Given how well the textbook is written, you shouldn't have trouble finding something that's confusing.
  - If you completely understand the text, you can think of a new example of one of the ideas and post that.
- **HOW IT AFFECTS YOUR GRADE:** 5% of your grade is for participating in the pre-class discussion. Each day's participation is worth the same amount.

## Group Work

- WHEN YOU'LL DO IT: In class
- WHEN IT'S DUE: At the end of class
- WHAT YOU'LL DO: Work with 2-3 other students on problems. As a group, you'll produce a shared write-up of the solutions, which you'll turn in at the end of class. We'll photocopy them and hand them back so everyone in your group can have a copy.
- WARM-UP PROBLEMS:
  - Most worksheets start with some warm-up problems. You can do these by yourself and compare answers with your group. If you get stuck, ask the rest of your group, or a TA, or me.
  - Make sure to compare answers to the warm-up problems with the rest of your group.
  - Your group doesn't need to turn in the warm-up problems.
- REGULAR PROBLEMS:
  - You **should** do the problems in order. If you get stuck or find one too difficult, ask a question.
  - Don't worry if you don't get through all of the problems. Most days have more problems than we expect most groups to get through. If you're behind where we think you need to be, we'll nudge you along or talk to you about it.
  - The problems are harder and/or more abstract than the ones you did before class. Don't be surprised if you and your group have to brainstorm a bit about how to solve a problem, or if the first approach you try doesn't work.
  - You should turn in a *solution*: it should be clear, correct, and most importantly, readable. Remember that the audience is your fellow classmates.
- WHERE YOU CAN GET HELP:
  - The TAs and I will be right there in the room to answer questions.
  - We'll pick good solutions from the write-ups and post them online.
- HOW IT AFFECTS YOUR GRADE: 10% of your grade is for class participation. Half of that is for showing up and half is for actively participating (being engaged in the conversation, not getting distracted by electronic devices, etc.). (I've never had to actually take away the participation grade from someone who showed up; as long as you're working you won't have a problem.) I'll drop the two days with your lowest participation score.  
The solutions themselves are *not* graded. Solutions to most problems will be posted (as written by you or your classmates).

## Homework

- **WHEN YOU'LL DO IT:** After the relevant class
- **WHEN IT'S DUE:** In recitation a week and a half after we're finished with the material. (So the 2nd week of the month we'll cover material, and the homework will be due on Monday of the 4th week.) Late homework *is* accepted; the penalty for turning it in late is 5% per week. (For instance, if it's turned in any time after the due date but before the end of the following recitation, it's -5%.)
- **WHAT YOU'LL DO:** Solve a few (typically around five) problems using the ideas you learned in class.
- **WHAT YOU NEED TO KNOW ABOUT IT:**
  - Each homework comes with information you can use to check that your answer is right. Usually this isn't enough to figure out the answer from it, but it's enough to check if your answer is right. Use this to make sure that your final answer is right.
  - The problems are harder than the online homework, but generally similar to the ones done in class.
  - In class we're learning new techniques. The homework is your chance to make sure you really understand what you did in class.
  - Remember to write a solution, not just the final answer.
  - Don't assume that you'll get every problem in one go: you should expect to work out a problem, maybe in more than one try, on scratch paper, and then write up a final solution which only the relevant work as your final version.
  - You'll get to use the homework as notes for solving the quiz in recitation. So if your homework is written clearly, it will be more useful to you.
- **WHERE YOU CAN GET HELP:**
  - Many problems are similar to ones done in class, so it may be helpful to look at your group's write-ups or the solutions from other groups posted online.
  - There's a lot of support available if you get stuck, including the online discussions, the drop-in hours, and both the TA's and my office hours.
- **HOW IT AFFECTS YOUR GRADE:** 5% of your grade is for completing the homework. The grade is for completing the homework; you don't have to get the problem right to get credit. The homework is collected in recitation along with the quiz.

## Recitation Quiz

- **WHEN YOU'LL DO IT:** At the beginning of recitation the same day you turn in the homework
- **WHAT YOU'LL DO:** Solve a single problem similar to one of the homework problems
- **WHAT YOU NEED TO KNOW ABOUT IT:**
  - You can use your homework as notes.
  - You don't need to do any kind of simplification.
  - Any important formulas from the book you might need will be included.
- **WHERE YOU CAN GET HELP:**
  - If you're doing the homework correctly—that means working each problem and making sure you understand each step—you shouldn't have trouble on the quiz.
- **HOW IT AFFECTS YOUR GRADE:** 10% of your grade is for the quiz. The quiz is graded for correctness out of 10 points.

## Midterm Exams

- **WHEN YOU'LL DO THEM:** Wednesday 9/24, 10/22, and 11/19 from 6:00pm to 7:30pm in DRL A1.
- **WHAT YOU'LL DO:** Take a midterm exam consisting of between 10 and 15 problems.
- **WHAT YOU NEED TO KNOW ABOUT THEM:**
  - You may bring a single sheet of regular 8"x11" inch paper to each exam with whatever notes you want on it.
  - Although most questions are multiple choice, you *must* show work to get credit. The standard for "showing enough work to get full credit" is that you have to convince the grader that you chose the answer based on correctly solving the problem rather than a lucky guess or making several mistakes which happened to cancel out. If you don't need to write down much (or any) work to find the right answer, you don't need to write much—just enough to show that you knew what you were doing.
  - If you're unable to attend one or more of the scheduled midterms, contact me ASAP so we can arrange an alternate time. You **MUST** let me know no later than September 12th or I can not guarantee that an alternate time is possible.
  - If you have an exam related accomodation (like extra time or a separate room), please contact the Office of Student Disabilities Service (SDS) at the Weingarten Learning Resources Center as soon as possible, since it sometimes takes them a while to process a request.
- **HOW THEY'LL AFFECT YOUR GRADE:** The midterms collectively make up 40% of your grade. Your worst midterm will count for 8%, the middle midterm for 14%, and your best midterm for 18%.

## Gateway Exams

- WHEN YOU'LL DO IT: Twice during the semester
- WHEN IT'S DUE: October 6th and November 3rd
- WHAT YOU'LL DO: Solve 10 problems on MyMathLab
- WHAT YOU NEED TO KNOW ABOUT IT:
  - You'll have an hour to solve 10 problems.
  - You'll have a one week window (Sep 29-Oct 6 for the first and Oct 27-Nov 3 for the second) to take the exam in. If you don't pass the first time, you have an additional week (until Oct 13 or Nov 10) to retake it and pass.
  - You can retake the exam four times.
  - After four tries, you need to talk to me. (I'll let you take it again, once we identify why you were struggling with it. The limit is to prevent you from wasting a lot of time taking it over and over.)
  - The gateway problems are generally harder versions of the pre-class homework problems—they're conceptually straightforward but long or complicated. They're very different from exam problems, which tend to be shorter but conceptually difficult.
- WHERE YOU CAN GET HELP:
  - If you're struggling with the gateway, e-mail me. (You don't need to take it four times—if you take it once and think you're having problems with the material, e-mail me right away!)
- HOW IT AFFECTS YOUR GRADE: You must pass the gateway exams to pass the class by getting at least 70% on it. It makes no difference how much you pass by or how many times you have to take it to pass.

## Final Exam

- WHEN YOU'LL DO IT: Friday, December 12 from 9:00am to 11:00 am.
- WHAT YOU'LL DO: Take a final exam similar in format to the midterms. It will be comprehensive, covering material from the whole semester.
- WHAT YOU NEED TO KNOW ABOUT IT:
  - You may bring a single sheet of regular 8"x11" inch paper to each exam with whatever notes you want on it.
  - Although the questions include multiple choice answers, you *must* show work for full credit. The standard for "showing enough work to get full credit" is that you have to convince the grader that you chose the answer based on correctly solving the problem rather than a lucky guess or making several mistakes which happened to cancel out. If you don't need to write down much (or any) work to find the right answer, you don't need to write much—just enough to show that you knew what you were doing.

HOW IT AFFECTS YOUR GRADE: 20% of your final grade is based on the final.