Math 252: Calculus I

The University of Oregon

CRN 34035

Spring 2022

Class Meetings: MTWF, 2–2:50

Instructor: Cruz Godar

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Office Hours: over Zoom — MW 3–3:50 and T 1–1:50, and by appointment

Learning Outcomes

A successful student can:

- evaluate limits using algebraic limit laws

- identify limits at $\pm\infty$ for rational functions

- identify limits of rational functions involving cancellation of linear factors from numerator and denominator

- compute left and right limits for a function (or decide they do not exist) given an expression or graph for the function

- identify the points where functions are continuous and/or differentiable given an expression or graph for the function

- state and use the definition of the derivative in terms of a limit of difference quotients

- state and use the product rule, quotient rule, chain rule, and linearity rules for derivatives

- interpret, including units, the derivative as an instantaneous rate of change of a quantity defined in an applied context

- recognize the derivative as the slope of a tangent line

- use calculus to approximate the value of a function near a point, given information about the function and/or its derivatives at that point

- compute derivatives of functions involving polynomials, exponentials, logarithms, and trig functions

- find the equation for the tangent line of a curve at a point

- calculate derivatives via implicit differentiation

- use the methods of calculus to find asymptotes, local minima/maxima, intervals of concavity, intervals of increase/decrease, and inflection points. Relate these properties to the graph of the function.

- find extrema of a function on open and closed intervals

- solve optimization problems

- solve related rates problems

- use L'Hospital's rule to evaluate indeterminate forms of limits, including cases requiring multiple applications

- use the intermediate value theorem to prove that roots of a function exist in a given closed interval

- state the mean value theorem

Materials

Textbook: *Calculus Volume 2* by Herman and Strang. This is a free textbook which you can access online here. I recommend downloading the pdf file so that you have offline access to the textbook. You are also welcome to purchase a physical copy (they're around $30), but this is unnecessary.

Calculator: A scientific calculator will save you time doing simple computations. You will only be allowed to use one of the following calculators on quizzes and exams: Casio fx-260, Casio fx-300MS (or Plus), Casio fx-300ES (or Plus), TI-30X (a, S, or IIS), TI-34. The TI-36 Pro is **not** allowed, and **no graphing calculators are allowed** either. The Casio fx-300MS is available from the UO Bookstore for about $13.

Logistical Stuff

Class is in person! Let's work to keep it that way. Masks are welcome but not required in the classroom. The most important thing is to stay home if you have cold or flu symptoms until you are feeling better, ideally with a negative covid test. Make a friend *today* and keep in touch. If you need to quarantine during the quarter, they'll be your first resource to keep up with class notes. If both of you need to quarantine, we'll handle that situation as necessary. If *I* need to quarantine, we'll follow the guidelines in the Provost's resource rubric, which is to get a substitute for both weeks.

Assignments and Grading

Your total grade in the class is determined by your attendance and participation, and your scores on the homework, quizzes, midterm exams, and the final exam, weighted in the following manner:

Reading Quizzes: 3%
Written Homework: 10%

WebWork: 10%

Weekly Quizzes: 7%

Midterm Exams: 20% each (40% total)

Final Exam: 30%

Your total grade at the end of the quarter will be rounded up to the nearest whole number. For example, a total grade of 88.2% will be rounded up to 89% and awarded a B+.

Reading Quizzes: I've decided to put in the time to provide interactive, typed lecture notes for this course — you can find them on the course website. These are there for two reasons: first, it's **much** easier to learn new material when you've seen it in some capacity before, even if you don't understand it very well the first time around. For this reason, reading the lecture notes or the textbook is required before each lecture. We'll have very short quizzes on Canvas — typically just a single multiple choice question per section — that ensure you're reading beforehand. Your lowest two reading quiz scores are dropped.

The second purpose the notes serve is as a lecture replacement if you need to quarantine during the quarter. Between them, the textbook, and friends' class notes, you should have plenty of resources to succeed while remote.

Homework: The homework is graded out of 16 points. You'll be given a handful of textbook problems to write up careful solutions to, and you'll be graded on two criteria: 8 points for thoroughly attempting all the problems, whether or not your solution is correct, and another 8 for the correctness of your solution on one of the problems, chosen randomly.

Homework will be assigned every Wednesday and due at the start of class the following Wednesday. Working with others is strongly encouraged, but the final work you submit must be your own. Your lowest homework score will be dropped. **No late work will be accepted unless there is a documented, excusable circumstance.** Such circumstances include sports events in which you are involved in an official capacity (competing or playing in the band, for example). If this is the case and you are given a make-up opportunity, the late work must be submitted no more than one week after its original due date.

All homework will be submitted via Canvas. You have two options:

- Handwrite your homework as usual and scan it, via a scanner or your smartphone. A series of pictures will *not* be accepted — only a single pdf file may be submitted. To use your smartphone for this, use the built-in document scanner in iOS (accessible through the Files app by tapping the ... menu and selecting *Scan Documents*), or the Adobe Scan app for Android.

- Typeset your homework. All the course documents (like this syllabus) are written in a language called LaTeX which compiles to the clean-looking pdf file you see. Although it takes an hour or two to become comfortable with, LaTeX is used by people in nearly every STEM-related field, and learning it now will give you a major headstart. To get started, make an account at Overleaf and create a new project. You can type as usual, and to render math expressions, surround them in dollar signs — for example, $\frac{1}{2}$ will render as $\frac{1}{2}$. I'm more than happy to help with any difficulties you run into here.

WebWork: We have WebWork due every week on Wednesday, covering the previous week's material. You can access the WebWork through the course website.

Quizzes: We'll have a quiz every week on Wednesday, during the last 20 minutes of class. Your lowest quiz score will be dropped. The purpose of these is to practice working in a timed environment before the exams, and serve more as a barometer for how well you're prepared for the exams than an evaluation of your ability at the time. If you aren't getting the scores you'd like on the quizzes, **reach out for help** before the exam. As with the homework, **no late work will be accepted unless there is a documented, excusable circumstance.** Such circumstances include sports events in which you are involved in an official capacity (competing or playing in the band, for example), or illnesses with doctor's notes.

Exams: Our class will have two midterms on the Wednesdays of weeks 4 and 8, taking up all 50 minutes of class time. Each midterm will cover multiple sections of material, and the final exam will cover all of the sections covered in the course. **No make-up or early exams will be offered, except in the case of a documented, excusable circumstance.** If this is the case, the exam must be taken as soon as possible, and no more than a week after it was originally given.

- Midterm 1: Wednesday, April 20th

- Midterm 2: Wednesday, May 18th

- Final: Wednesday, June 8th at 2:45 PM

A note on grading: the vast majority of problems in this class are graded on a four-point scale that is curved to an eight-point one:

8: Work that shows command of the material and has only a few small mistakes, if any.

7: Work that shows a strong understanding of the relevant material, but contains enough errors that they get in the way of the demonstration of that understanding.

5: Work that shows elements of understanding, but is too clouded with mistakes to be considered on the right track.

3: Work that demonstrates a very small amount of understanding, but still some.

0: No work shown for any problem where work is required or work that demonstrates no understanding at all of the relevant material.

Course Schedule

This schedule is tentative, and may change slightly throughout the quarter.

Week	Sections
1	0, 1
2	2
3	3, 4
4	5, 6
5	7
6	8, 9
7	10
8	11, 12
9	13, 14
10	Review

Section 0: Algebra and Trig Review

Section 1: Intro to Limits

Section 2: Limit Rules

Section 3: Continuity

Section 4: Intro to Derivatives

Section 5: Derivative Rules

Section 6: Applications of Derivatives

Section 7: Exponential, Logarithmic, and Trig Derivatives

Section 8: The Chain Rule

Section 9: Implicit Differentiation

Section 10: Linear Approximation

Section 11: Optimization

Section 12: Derivatives and Graphs

Section 13: L'Hôpital's Rule

Section 14: Related Rates

Section 15: Applied Optimization

Other Things

Accessibility: For those of you who are currently registered with Accessible Education Center for a documented disability, please present your paperwork to me during the first week of the term (or earlier) so that we can design a plan for you. Those of you with a disability, or who think they might have one, but are not registered with AEC should contact them as soon as possible. It is much more likely that measures can be taken to provide adequate special accommodation if the organization is done through AEC. Please let me know if you need additional accommodations.

Prohibited Discrimination and Harassment Reporting: I am a student-directed employee. For information about my reporting obligations as an employee, please see Employee Reporting Obligations. Students experiencing any form of prohibited discrimination or harassment, including sex or gender based violence, may seek information on safe.uoregon.edu, respect.uoregon.edu, titleix.uoregon.edu, or aaeo.uoregon.edu or contact the non-confidential Title IX office (541-346-8136), AAEO office (541-346-3123), or Dean of Students offices (541-346-3216), or call the 24-7 hotline 541-346-SAFE for help. I am also a mandatory reporter of child abuse. Please find more information at Mandatory Reporting of Child Abuse and Neglect.

Conduct: This university exists for your benefit. If you believe something is not as it should be, don't hesitate to let me know.

And as you should hold the university to a high standard, I will hold all of you to one in return. Academic dishonesty, including looking at other students' quizzes or tests or using any materials other than those allowed during a testing period, submitting others' work as your own, or altering returned work and resubmitting it, will be met with the strictest disciplinary action possible.

A word on learning: Math is not a subject that is learned passively. It is one thing to understand examples from lecture and another thing entirely to work through problems by yourself. Students who come to lecture expecting it to be enough on its own to pass the tests — and therefore don't put much or any effort into the homework — typically end up with very poor class grades. For

your own benefit, it's crucial to stay on top of the homework, to follow along with lecture, and to seek help — from a friend, from my office hours, from the textbook, or from a tutor — when that becomes difficult. In the same vein, it's critical that if you're struggling, you reach out before large assignments, not after. I want to help however I can, but if a test has already been graded and handed back, there's usually nothing I can do.

The official COVID policy

Academic Disruption: In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas. In the event that the instructor of this course has to quarantine, this course may be taught online during that time.

COVID Containment Plan for Classes: As the University of Oregon returns to in-person instruction, the key to keeping our community healthy and safe involves prevention, containment, and support. Here is information critical to how the UO is responding to COVID-19.

Prevention: To prevent or reduce the spread of COVID-19 in classrooms and on campus, all students and employees must:

Comply with vaccination policy

Wear face coverings in all indoor spaces on UO campus

Complete weekly testing if not fully vaccinated or exempted

Wash hands frequently and practice social distancing when possible

Complete daily self-checks

Say home/do not come to campus if feeling symptomatic

If you have mild viral symptoms that do not require medical attention and you have not tested positive for COVID in the previous 90 days, students can drop by UHS to get a free COVID-19 self-test kit to more quickly determine if you have Covid

Complete the UO COVID-19 case and contact reporting form if you test positive or have been in

close contact with a confirmed or presumptive case.

Containment: If a student in class tests positive for COVID-19:

Instructors should follow the guidance in the Instructor Notification email

Follow guidance in classroom notification email if sent to an entire class

If notified by a student that they have tested positive for Covid or believe they have Covid, both instructors and the student should complete the UO COVID-19 case and contact reporting form

Answer the call if contact by the Corona Corps (541-356-2292)

Isolate if you test positive or are symptomatic

Quarantine if you are an unvaccinated close contact or a vaccinated close contact with symptoms

Test weekly if you are unvaccinated or partially vaccinated

Stay home if symptomatic and complete the UO COVID-19 case and contact reporting form

Support: The following resources are available to you as a student. University Health Services or call (541) 346-2770

University Counseling Center or call (541) 346-3277 or (541) 346-3227 (after hrs.)

MAP Covid-19 Testing

Corona Corps or call (541) 346-2292

Academic Advising or call (541) 346-3211

Dean of Students or call (541) 346-3216