Math 32A: Calculus of Several Variables
UCLA, Spring 2025

Location and Time:

- Lectures: Monday, Wednesday, Friday 12 PM-12:50 PM, Bunche Hall 2209A
- Discussions:
    - 2A, Tuesday 12 PM-12:50 PM, Mathematical Sciences 5147
    - 2B, Thursday 12 PM-12:50 PM, Mathematical Sciences 5147
    - 2C, Tuesday 12 PM-12:50 PM, Bunche Hall 3153
    - 2D, Thursday 12 PM-12:50 PM, Bunche Hall 3153
    - 2E, Tuesday 12 PM-12:50 PM, Perloff Hall 1102
    - 2F, Thursday 12 PM-12:50 PM, Perloff Hall 1102

Instructor

Linfeng Li

Email: lli265@math.ucla.edu

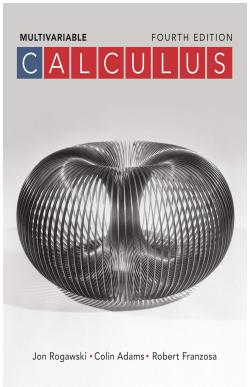
Office hours: Monday 3pm - 4pm; Wednesday 4pm - 5pm at Mathematical Sciences 5352

Course website: https://www.math.ucla.edu/~lli265/math32a

Teaching Assistants

- Sections: 2A, 2B
    - Siddharth Mulherkar
    - Email: sidmulherkar@ucla.edu
    - Office hours: Tuesday 2pm - 3pm at Mathematical Sciences 6154
- Sections: 2C, 2D
    - Matthew Hung
    - Email: fyhung@math.ucla.edu
    - Office hours: Friday 3pm - 4pm at Mathematical Sciences 3915B
- Sections: 2E, 2F
    - Xiang Li
    - Email: xiangli@math.ucla.edu
    - Office hours: Monday 2pm - 3pm at Mathematical Sciences 2954

Topics, textbook and prerequisite



Topics: vector geometry; vector-valued functions; differentiation in several variables; optimization. We will roughly adhere to the schedule and topics posted at https://ww3.math.ucla.edu/courses/.

Textbook: Jon Rogawski, Colin Adams, and Robert Franzosa, *Calculus: Late Transcendentals Multivariable*, fourth edition, W. H. Freeman.

Prerequisite: math 31A with a grade of C- or better. If math 32A is required for your major or pre-major, you should take for a letter grade (LG), not pass/fail (PN).

Exams

Midterms: there will be two in-class midterms and they will take place on **Monday April 21, 12 PM-12:50 PM** and **Friday May 16, 12 PM-12:50 PM**. No makeup midterms will be given. Note that the dual grading scheme however accommodates for one missed midterm. You are allowed to bring a handwritten cheat sheet on a single 8.5"× 11" paper (double-sided) to both midterms.

Final: the final exam is cumulative and will be on **Wednesday June 11, 3 AM-5 PM**. There will be no makeup final. In particular, the university policy requires that a student, who has an undocumented absence from the final exam, be given a failing grade in the course. If you anticipate being unable to attend the final exam for a legitimate reason, please inform the instructor as soon as possible. You are allowed to bring a handwritten cheat sheet on a single 8.5"× 11" paper (double-sided) to the final.

Quizzes

There will be three quizzes during discussion sections on week 3, 6, and 9; the duration is 20 minutes. The quizzes are different for Tuesday and Thursday. There will be no makeup quiz but your lowest quiz will be dropped automatically at the end of the quarter. You are allowed to bring a handwritten cheat sheet on a single 3"× 5" index card (double-sided) to quizzes.

Homework

Homework will be assigned on the course website weekly on Monday and due **the next Monday at 11:59 PM**. Homework will be collected via Gradescope. **No late homework will be accepted**, but your lowest homework will be dropped automatically at the end of the quarter. Show all of your work and put a box around your final answer. Each homework worth 10 points and graded based on both correctness and completeness. Two problems will be randomly chosen to be graded for correctness, each worth 2 points; the overall completion worth 6 points. You are encouraged to work in groups on the homework, but ultimately you are expected to be responsible for writing up your homework.

	Due date	Assignments
Homework 1	04/07 11:59 PM	Sec 13.1 Exercises 2 14 24 38 46 48 Sec 13.2 Exercises 10 24 34 38 48 60
Homework 2	04/14 11:59 PM	Sec 13.3 Exercises 12 16 44 48(b) 58 Sec 13.4 Exercises 6 12 26 40 48 Sec 13.5 Exercises 14 18 22 42 54
Homework 3	04/21 11:59 PM	Sec 12.1 Exercises 30 34 60 Sec 14.1 Exercises 8 14 20 42 Sec 14.2 Exercises 4 8 24 26 48
Homework 4	04/28 11:59 PM	Sec 14.3 Exercises 4 6 16 22 32 Sec 14.4 Exercises 4 12 32 36 42 44
Homework 5	05/05 11:59 PM	Sec 14.5 Exercises 4 8 14 22 28 Sec 14.6 Exercises 2 4 8
Homework 6	05/12 11:59 PM	Sec 15.1 Exercises 8 20 22 42 43 48 Sec 15.2 Exercises 4 10 20 34 36 42 51
Homework 7	05/19 11:59 PM	Sec 15.3 Exercises 4 12 14 44 49 50 52a 56 60
Homework 8	05/26 11:59 PM	Sec 15.4 Exercises 4 12 18 20 27 32 Sec 15.5 Exercises 6 16 24 34 38ab Sec 15.6 Exercises 4 8 12 16
Homework 9	06/02 11:59 PM	Sec 15.7 Exercises 4 8 10 18 40 46 48 54
Homework 10	Optional	Sec 15.8 Exercises 2 8 12 18 21 26

Lecture plan

Lecture topics by day will be posted on an ongoing basis throughout the quarter. The lecture notes will also be updated after each lecture in the dropbox.

	Date	Lecture topics (Textbook references)
week 1	M 03/31	basics of vectors (13.1)
	W 04/02	basics of vectors (13.1); vectors in 3D (13.2)
	F 04/04	dot product (13.3)
week 2	M 04/07	orthogonality, projection (13.3); cross product of 3D vectors (13.4)
	W 04/09	cross product, volume and area (13.4); planes in 3D (13.5)
	F 04/11	parametric equations in 2D (12.1)
week 3	M 04/14	vector-valued functions (14.1)
	W 04/16	calculus on vector-valued functions (14.2)
	F 04/18	arc length and speed (14.3)
week 4	M 04/21	midterm #1
	W 04/23	arc length and speed (14.3); curvature (14.4)
	F 04/25	curvature (14.4)
week 5	M 04/28	motion in space (14.4); planetary motion (14.5)
	W 04/30	Kepler's three laws (14.5)
	F 05/02	function of two variables; level curve and contour map (15.1)
week 6	M 05/05	function of two or more variables (15.1)
	W 05/07	limits and continuity (15.2)
	F 05/09	partial derivatives (15.3)

week 7	M 05/12	approximation; higher-order partial derivatives (15.3)
	W 05/14	tangent plane; linear approximation (15.4)
	F 05/16	midterm #2
week 8	M 05/19	the gradient and directional derivative (15.5)
	W 05/21	the gradient and directional derivative (15.5)
	F 05/23	multivariable chain rule (15.6)
week 9	M 05/26	university holiday - no class
	W 05/28	optimization (15.7)
	F 05/30	optimization (15.7)
week 10	M 06/02	Lagrange multiplier (15.8)
	W 06/04	Lagrange multiplier (15.8)
	F 06/06	final review

Calculator

You may use calculator on your homework problems. However, any electronic device, including calculator, will not be allowed in quizzes, midterms or the final.

Grades

Your final average will be calculated using the better of the following two schemes:

- Homework: 20%
- Quizzes: 10%
- Midterms 1 & 2: 20% each
- Final: 30%

or

- Homework: 20%
- Quizzes: 10%
- Best midterm: 30%
- Final: 40%

Completing the course evaluation at the end of the quarter will earn you 2% extra credit towards your final grade. Here is a tentative final letter grade scale. The instructor reserves the right to award an A+ for exceptional performance.

Letter Grade	Final Average
A	93% - 100%
A-	90% - 92.9%
B+	87% - 89.9%
B	83% - 86.9%
B-	80% - 82.9%
C+	77% - 79.9%
C	73% - 76.9%
C-	70% - 72.9%
D+	67% - 69.9%

Curve policy

A very common question students may ask is: “Will this class or exam be curved?” Curving is the process of assigning course grades so that there is a fixed and pre-determined mean or median. We do not curve in this class! Your letter grade will not be based on some quota of how many students receive each letter grade. At the end of the quarter, the instructor may adjust some thresholds downwards. Under no circumstances will the grade cut-offs be set higher than those mentioned above.

Free Tutoring

Student Math Center (SMC), located in Mathematical Sciences 3974, will open through week 2-10 of an academic quarter. The hours of operation are Monday through Thursday, 9 AM to 4 PM. The SMC offers free, individual and group tutoring for all lower division math courses. This service is available on a walk-in basis; no appointment is necessary. Students may ask any of the TAs in attendance for assistance with math problems. More information can be found at https://ww3.math.ucla.edu/student-math-center/

Academic Integrity

The instructor strongly adheres to the University policies regarding principles of academic honesty and academic integrity violations, and will strictly enforce these rules. You are encouraged to review those in the UCLA Student Conduct Code.

Students with disabilities

Any student requesting academic accommodations based on a disability is required to register with the Center for Accessible Education (CAE).