

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF UTAH
Calculus I
MATH 1210 – Section 023 – Spring 2025
Final Exam topics covered

The Final Exam is on Tuesday, Apr 29, 2025 at 10:30am in CTIHB 109

The Final Exam is 120 minutes.

All you need to bring is a pen or pencil to write with.

I will provide a reference sheet for you during the exam. You can find this reference sheet here:
<https://www.sci.utah.edu/~akil/docs/courses/2025spring/math1210/reference-sheet.pdf>.

(You do not need to print this sheet out; I will have a printout for you.)

None of the following are allowed for exams: notes, textbook, calculators, laptop, phone.

The final exam covers the following sections in the textbook:

- Sections 1.1, and 1.3 - 1.6
- Sections 2.1-2.9
- Sections 3.1-3.8
- Sections 4.1-4.6
- Sections 5.1-5.3

The material on the final exam will be drawn from the following homework assignments:

- Homework assignments 1-14 (all of them)

The concepts tested include the following:

- Limits
 - Graphical intuition of a limit
 - Intuitive meaning of a limit
 - Right- and left-handed limits
 - Computing limits (substitution, cancellation, special trigonometric limits)
 - Limits at infinity
 - Limits evaluating to $\pm\infty$
 - Determining horizontal and vertical asymptotes from limits
- Continuity
 - Definition of continuity at a point
 - Continuity on an interval
 - Right-continuity and left-continuity
- The derivative
 - Interpretations of the derivative: slope of the tangent line, and velocity
 - Definition of the derivative
 - Computing derivatives of functions
 - Power rule
 - Constant multiple, sum, and difference rules
 - The product and quotient rules
 - Derivatives of trigonometric functions
 - The chain rule

- High-order derivatives (and velocity, acceleration)
 - Implicit differentiation
- Applications of differentiation
 - Related rates problems
 - (Linear) approximations and differentials
 - Extrema, maxima, and minima
 - Computing extrema on closed intervals
 - Stationary, singular, and critical points
 - Monotonicity, concavity, and inflection points
 - Identifying intervals where functions are increasing, decreasing, concave up, and concave down
 - Inflection points
 - Graphing functions with calculus
 - “Practical problems”: problems involving optimization with calculus
 - Mean value theorem
 - Solving equations numerically
 - Antiderivatives
- Area and definite integrals
 - Computing areas via polygons
 - Summations
 - Riemann sums and integrable functions
 - The definite integral
 - The Fundamental Theorem of Calculus (I and II)
 - Average values of functions, the Mean Value Theorem for Integrals
 - Evaluating integrals using symmetry of functions
- Computing areas and volumes
 - Areas of planar regions
 - Areas as limits of Riemann sums, both with vertical and horizontal slices
 - Volumes of solids of revolution: cylinders, slabs, and washers
 - Volumes of solids of revolution: shells

“Will topic X be covered on the exam?”

This exam is cumulative. Everything we have covered, and everything that you have completed homework assignments and/or labs on, is covered.