

Textbook Information

Math 207 GH – Calculus and Analytic Geometry I

Fall 2017

Lecture Notes, Worksheets

Most topics covered in the class will be presented via handouts. These will be available at the [class's web site](#), as pdf files. All students must monitor the class's web site for handouts and announcements.

Textbook

The class's textbook policy is as follows. **Students must have a textbook but it does NOT have to be the official textbook designated for this course.** This policy is intended to lower textbook costs. Usually students can purchase a textbook for the course under \$40. Students are welcome to use any previous edition at a much lower cost. Students also may rent or purchase e-versions of a calculus book.

The Mathematics Department selected Calculus 7E by Hughes-Hallett. Due to price considerations, the use of this book will not be mandatory in this class.

As this is an excellent text, students are encouraged to buy a previous edition of this textbook. Students also may use other calculus books. However, it is essential that students use a text that is labeled **early transcendentals**. (That is what the E stands for in 7E.) Other, excellent texts include any early transcendental version (any edition) of calculus textbooks written by:

Soo T. Tan
George B Thomas
Ron Larson

Jerrold E. Marsden
James Stewart
William Briggs

Open source textbooks are also available. Open source means free pdf download, in this case, here: <https://openstax.org/subjects/math>. Students are encouraged to download and use the open source calculus textbooks.

Online Homework

Homework will be assigned on MyOpenMath, an open source online platform. The use of MyOpenMath is completely free, and students can register at <https://www.myopenmath.com>. The use of MyOpenMath will be mandatory in the class.

Contents of Textbook

1. Foundations for Calculus: Functions and Limits

- 1.1 Functions and Change
- 1.2 Exponential Functions
- 1.3 New Functions from Old
- 1.4 Logarithmic Functions
- 1.5 Trigonometric Functions
- 1.6 Powers, Polynomials, and Rational Functions
- 1.7 Introduction to Limits and Continuity
- 1.8 Extending the Idea of a Limit
- 1.9 Further Limit Calculations Using Algebra

2. Key Concept: The Derivative

- 2.1 How Do We Measure Speed?
- 2.2 The Derivative at a Point
- 2.3 The Derivative Function
- 2.4 Interpretations of the Derivative
- 2.5 The Second Derivative
- 2.6 Differentiability

3. Short-Cuts to Differentiation

- 3.1 Powers and Polynomials
- 3.2 The Exponential Function
- 3.3 The Product and Quotient Rules
- 3.4 The Chain Rule
- 3.5 The Trigonometric Functions
- 3.6 The Chain Rule and Inverse Functions
- 3.7 Implicit Functions
- 3.8 Hyperbolic Functions
- 3.9 Linear Approximation and the Derivative
- 3.10 Theorems About Differentiable Functions

4. Using the Derivative

- 4.1 Using First and Second Derivatives
- 4.2 Optimization
- 4.3 Optimization and Modeling
- 4.4 Families of Functions and Modeling
- 4.5 Applications to Marginality
- 4.6 Rates and Related Rates
- 4.7 L'Hopital's Rule, Growth, and Dominance
- 4.8 Parametric Equations

5. Key Concept: The Definite Integral

- 5.1 How Do We Measure Distance Traveled?
- 5.2 The Definite Integral
- 5.3 The Fundamental Theorem and Interpretations
- 5.4 Theorems About Definite Integrals

6. Constructing Antiderivatives

- 6.1 Antiderivatives Graphically and Numerically
- 6.2 Constructing Antiderivatives Analytically
- 6.3 Differential Equations and Motion
- 6.4 Second Fundamental Theorem of Calculus

7. Integration

- 7.1 Integration by Substitution
- 7.2 Integration by Parts
- 7.3 Tables of Integrals
- 7.4 Algebraic Methods for Definite Integrals
- 7.5 Numerical Methods for Definite Integrals
- 7.6 Improper Integrals
- 7.7 Comparison of Improper Integrals

8. Using the Definitive Integral

- 8.1 Areas and Volumes
- 8.2 Applications to Geometry
- 8.3 Area and Arc Length in Polar Coordinates
- 8.4 Density and Center of Mass
- 8.5 Applications to Physics
- 8.6 Applications to Economics
- 8.7 Distribution Functions
- 8.8 Probability, Mean, and Median

9. Sequences and Series

- 9.1 Sequences
- 9.2 Geometric Series
- 9.3 Convergence of Series
- 9.4 Tests for Convergence
- 9.5 Power Series and Interval of Convergence

10. Approximating Functions Using Series

- 10.1 Taylor Polynomials
- 10.2 Taylor Series
- 10.3 Finding and Using Taylor Series
- 10.4 The Error in Taylor Polynomial Approximations
- 10.5 Fourier Series

11. Differential Equations

- 11.1 What is a Differential Equation?
- 11.2 Slope Fields
- 11.3 Euler's Method
- 11.4 Separation of Variables
- 11.5 Growth and Decay
- 11.6 Applications and Modeling
- 11.7 The Logistic Model
- 11.8 Systems of Differential Equations
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- 11.10 Second-Order Differential Equations: Oscillations
- 11.11 Linear Second-Order Differential Equations

12. Functions of Several Variables

- 12.1 Functions of Two Variables
- 12.2 Graphs and Surfaces
- 12.3 Contour Diagrams
- 12.4 Linear Functions
- 12.5 Functions of Three Variables
- 12.6 Limits and Continuity

13. A Fundamental Tool: Vectors

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14. Differentiating Functions of Several Variables

- 14.1 The Partial Derivative
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- 14.3 Local Linearity and the Differential
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- 14.6 The Chain Rule
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15. Optimization: Local and Global Extreme

- 15.1 Critical Points: Local Extreme and Saddle Points
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- 16.3 Triple Integrals
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- 17.2 Motion, Velocity, and Acceleration
- 17.3 Vector Fields
- 17.4 The Flow of a Vector Field

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- 18.2 Computing Line Integrals Over Parameterized Curves
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20. The Curl and Stokes' Theorem

- 20.1 The Curl of a Vector Fields
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- 21.3 Flux Integrals Over Parameterized Surfaces