MATH 10a: METHODS AND TECHNIQUES OF CALCULUS
Summer 2015

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Office hours: to be announced

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Prerequisite. Knowledge of precalculus. This prerequisite can be satisfied by taking Math 5a at Brandeis or by achieving a satisfactory score on the math department’s online placement exam (see http://www.brandeis.edu/registrar/newstudent/testing.html#mathtest).

IMPORTANT! Most students who struggle in Math 10a do so because they lack a solid knowledge of precalculus. To ensure that students are placed correctly, there will be a quiz on precalculus in the third class of the semester. Students who do very poorly on the precalculus quiz will be required to take Math 5a or to take 10a in a later semester. All students must take the quiz, and it counts as part of their quiz grade for the course.

Syllabus. The course will cover the following sections of the text: Sections 2.1–2.8, 3.1–3.5, 3.7–3.9, 4.2–4.6, 4.8. We will also cover topics in differential equations, if time permits.

Exams. There will be one midterm exam, and one final exam.

- Midterm Exam: June 16 (time TBA)
- Final Exam: Thursday, July 2nd or Friday, July 3rd (time TBA)

Grades. Your grade in the course will be based on the following:

1. Homework (20% of your grade).
   - Homework assignments will be collected once or twice a week.
   - **No late homeworks will be accepted**, but your three lowest homework grades will be dropped.
   - We encourage you to discuss homework problems with your classmates, but you must write up your own solutions. **You may not use any solution manuals.**

2. Quizzes (20% of your grade).
   - Short quizzes will be given regularly.
   - **No make-up quizzes will be given.** Missed quizzes count as zeroes. However, the lowest 25% of your quiz grades will be dropped.

3. Midterm exam (30% of your grade).
4. Final exam (30% of your grade).

Calculators. You should have access to a scientific calculator (a free online one is fine). You do not need a graphing calculator for Math 10a. Calculators are **not** allowed during exams or quizzes.
LATTE. All course materials for Math 10a will be available online on LATTE. Log in at http://latte.brandeis.edu using your Unet username and password.

Math 10a Self-quizzes. There is a link called Selfquizzes on your Math 10a LATTE coursepage. The Math 10a selfquizzes cover all the material being studied in Math 10a. Complete solutions to each selfquiz are given. These selfquizzes are optional, to help you study for exams, and they have no effect on your grade.

Office hours. You are encouraged to use your instructor’s office hours whenever you have questions about the course material. If you can’t attend office hours, don’t hesitate to make an appointment for another time.

Students with disabilities. If you are a student who needs academic accommodations because of a documented disability you should contact Professor Susan Parker and present your letter of accommodation as soon as possible. Professor Parker’s email is parker@brandeis.edu and her extension is 63053. If you have questions about documenting a disability or requesting academic accommodations you should contact Beth Rodgers-Kay in the Office of Academic Services at 63470 or at brodgers@brandeis.edu. Letters of accommodations should be presented at the start of the semester to ensure provision of accommodations. Accommodations cannot be granted retroactively.

Academic Integrity. You are expected to follow the University’s policy on academic integrity, which is distributed annually as Section 4 of the Rights and Responsibilities Handbook (see http://www.brandeis.edu/studentaffairs/srs/rr/index.html). Instances of alleged dishonesty will be forwarded to the Department of Student Development and Conduct for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University. If you have any questions about how these policies apply to your conduct in Math 10a, please ask.

Learning Goals for Math 10a. The learning goals for Math 10a include the following. Students will:

- Develop a basic understanding of limits and learn to compute a variety of limits.
- Understand the definition of the derivative, and its interpretation in terms of slope and instantaneous rate of change.
- Learn to compute derivatives of polynomial, rational, exponential, logarithmic and trigonometric functions, as well as combinations of these functions.
- Learn to use the derivative to analyze the behavior of functions, e.g., finding the extrema of functions and determining the end behavior of functions.
- Learn to apply derivatives to a variety of optimization problems and to applied rate of change problems.
- Learn to compute antiderivatives of polynomial, rational, exponential, logarithmic and trigonometric functions.
Topics covered in Math 10a (Differential Calculus)

Section 2.1 The Tangent and Velocity Problems
Section 2.2 The Limit of a Function
Section 2.3 Calculating Limits Using the Limit Laws
Section 2.4 Continuity
Section 2.5 Limits Involving Infinity
Section 2.6 Derivatives and Rates of Change
Section 2.7 The Derivative as a Function
Section 2.8 What Does $f'$ Say about $f$?

Section 3.1 Derivatives of Polynomials and Exponential Functions
Section 3.2 The Product and Quotient Rules
Section 3.3 Derivatives of Trigonometric Functions
Section 3.4 The Chain Rule
Section 3.5 Implicit Differentiation (including related rates)
Section 3.6 Derivatives of Logarithmic Functions
Section 3.8 Rates of Change in the Natural and Social Sciences
Section 3.9 Linear Approximation and Differentials

Section 4.2 Maximum and Minimum Values
Section 4.3 Derivatives and Shapes of Curves
Section 4.4 Graphing with Calculus and Calculators [no calculators used]
Section 4.5 Indeterminate Forms and L'Hôpital's Rule
Section 4.6 Optimization Problems
Section 4.8 Antiderivatives