Math 19: Calculus — Summer 2010

Lecture Information

Section 01
Time: Monday, Tuesday, Wednesday, and Thursday, 1:15–2:05 pm
Location: Applied Physics 200
Instructor: Eric Malm

Section 02
Time: Monday, Tuesday, Wednesday, and Thursday, 2:15–3:05 pm
Location: Cubberley Education, Room 206
Instructor: Anca Vacarescu

Office Hours and Contact Information

Students should feel free to attend the office hours of either instructor or course assistant. All Math 19 staff have office space in Building 380, Room 381E (on the first floor), but office hours may be held elsewhere.

We will also be using CourseWork (`http://coursework.stanford.edu`) to send course announcements and to post materials, solution sets, and homework and exam grades.

Anca Vacarescu
Office Hours: MTW, 3:15–4:15 pm, in Bldg. 360, Room 361A
E-mail: `ancav@math.stanford.edu`
Website: `http://math.stanford.edu/~ancav/Math19`

Eric Malm
Office Hours: MT, 10–11 am, and Th, 3:15–4:15 pm, in Bldg. 360, Room 361A
E-mail: `emalm@math.stanford.edu`
Website: `http://math.stanford.edu/~emalm/teaching/math19/`

Course Assistants: **Brian Krummel** (Weeks 1–4) and **Sukhada Fadnavis** (Weeks 5–8)
Office Hours: M, 4:15–5:15 pm, and TTh, 11 am–12 noon, in Bldg. 380, Room 381E
E-mail: `bkrummel@math.stanford.edu`, `sukhada@math.stanford.edu`

Course Description

This course is an introduction to differential calculus of one variable. Calculus is a branch of mathematics that studies how mathematical quantities change. For example, we may want to know how the position or velocity of a moving ball changes with time, how the volume of water in a reservoir changes with its height, and how the area of a triangle

changes when we vary the length of a side. Although we may already know formulas for these relationships from physics, geometry, and trigonometry, calculus will let us easily answer harder questions such as "What is the maximum height the ball will reach?", "How fast does the water level rise if we pump in water at a constant rate?", and "What side length gives us the maximum area for our triangle?"

We will represent these quantities using functions, and the *derivatives* of these functions tell us about how they change. Our three main goals in Math 19 are to:

- Define the derivative of a function (and technical tools such as limits) (Chapter 2)
- Learn rules for computing derivatives of many common functions (Chapter 3)
- Interpret derivatives and apply them to solve problems (Chapter 4)

We will also do a small amount of precalculus review (Chapter 1). Using derivatives, we will learn how to graph functions and their tangent lines, find local extrema, calculate polynomial approximations, calculate related rates, and solve optimization problems.

We will also focus on geometric interpretations of the concepts of calculus, and on converting "word problems" to mathematical language and then using the tools of differential calculus to solve them.

Prerequisites: Students are expected to be proficient in pre-calculus, including basic algebra and trigonometry. In particular, the student should know the concept of a function, basic notation for polynomials, the quadratic formula, factoring polynomials and polynomial division, trigonometric functions and their interpretation, and graphing and finding the equation of a line. We will spend the first few lectures reviewing some of these concepts. Students who are unsure of their background in algebra or trigonometry should see one of the instructors for help.

Text: The course textbook is *Single Variable Calculus: Concepts and Contexts*, Fourth Edition (2010), by James Stewart. The book is on permanent reserve in the Math Library (on the fourth floor of Building 380). This text will also be used for Math 20 and 21.

Lectures

We expect each student to attend lecture and to participate in class. Lectures will focus on conceptual explanations of the course material as well as on computations and examples.

Homework

Homework will consist of three parts:

- **Problems:** You will be expected to write up these problems carefully and to hand them in once a week. These will be graded and returned to you.
- **Exercises:** This will be a list of problems that you must do, even though they will not collected for grading. They will give you practice in addition to the work you will turn in, and we will likely choose these problems or ones similar to them for the exams.

- **Reading Assignment:** We will cover a lot of material in this course, and often we will not have time to go over all the relevant examples in lecture. Thus, we expect you to read the sections in the textbook before class and to have questions ready about the topics you did not understand.

Homework problems are due every Tuesday by 4:30 pm. They will cover the material covered in the previous week. Please turn in the homework at your instructor's office (380-381E) or math department mailbox, or in class. Since solutions to the homework will be posted on Tuesday evening, late homework is not accepted. We will drop the lowest homework score, however.

You should write up the homework questions in order. Multiple sheets should be **stapled together**; paper clips and corner folding are not acceptable. Answers should be simplified when possible and kept in exact form (i.e., do not give a decimal approximation unless specifically asked). You are encouraged to work with others on your homework, but you should only discuss problems you have already attempted yourself. Each student must write up their own solutions individually.

Quizzes

Every Wednesday (or Monday, on midterm week), there will be a short quiz during the first few minutes of class. These quizzes are designed to help solidify material from the previous week, and to make sure you understand the material from the homework set you turned in on Tuesday. There will be no makeup quizzes given, but the lowest score will be dropped.

Exams

There will be one midterm exam and one final exam. The problems on the exams will be similar to examples done in class and homework problems. If you have a conflict with a scheduled exam time, please let one of the instructors know as soon as possible, and in any case before July 2nd.

Midterm	Tuesday, July 20	7:00–9:00 pm	in Hewlett 201
Final Exam	Friday, August 13	7:00–10:00 pm	in Hewlett 201

Please note that the final exam is given during the group exam time, and not during the time slot that would ordinarily be associated with the class.

Grading

Although the lowest homework and quiz scores will be dropped, all should be submitted. The scores from homework and exams will be weighted as follows.

Homework:	20%
Quizzes:	10%
Midterm:	30%
Final Exam:	40%

Please note that the exam scores are the most important factor in the course grade.

Calculators

Calculators will not be allowed on the exams. Although calculators may be useful for the homework, they will never be required. Even if you get the correct answer to a homework problem via a calculator, you will not receive full credit unless you include all intermediate work leading to the answer.

How To Get Help

Your first resource for help in the class should be the office hours of the instructors and the course assistant. For additional help, there is free tutoring available from the Center for Teaching and Learning on Monday, Tuesday, and Wednesday evenings; see `http://tutoring.stanford.edu` for the location and schedule. Your fellow students are also an excellent resource for help, and we recommend that students work and study together in small groups.

Stanford Policies

Academic Integrity: You will be expected to follow the Stanford Honor Code, accessible at `http://www.stanford.edu/dept/vpsa/judicialaffairs/guiding/honorcode.htm`. You will be asked to indicate that you have read and respected the honor code before exams.

Americans with Disabilities Act: Please let one of the instructors know if you need any special accommodations for this class, as specified by the Disability Resource Center at Stanford (`http://www.stanford.edu/group/DRC/`).