MATH 19 SYLLABUS, WINTER 2006

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Office Hours:	W 2-3pm, Th 3-5pm	Office Hours:	W 6-9pm, Th 1-3pm

1. Course Content

Math 19 centers around the development of differential calculus. Differential calculus came about from attempts to solve the so-called tangent problem: given a point P on a curve, one is asked to find the line ℓ which passes through P and is tangent to the graph of the curve.

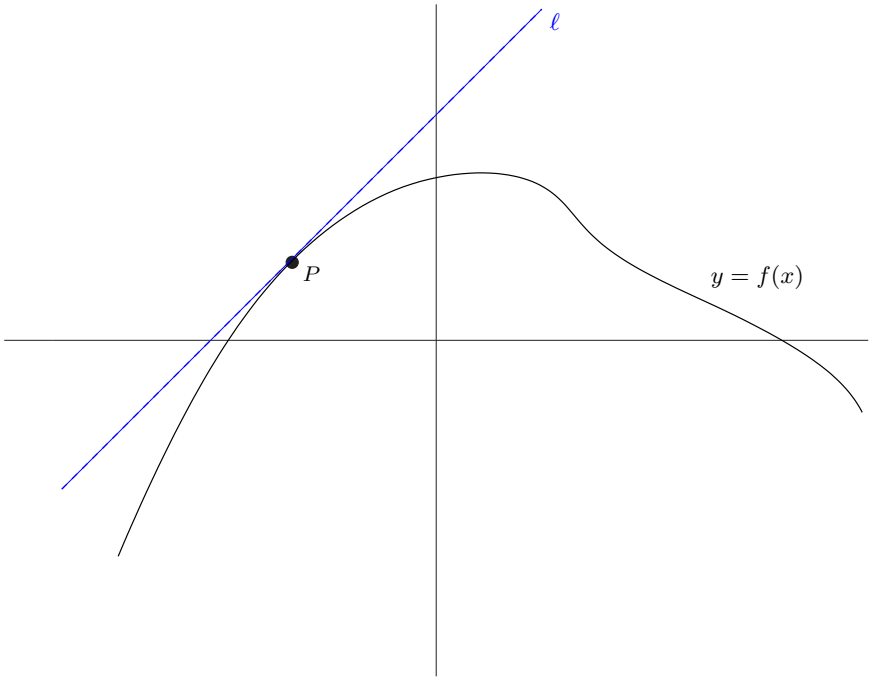

Figure 1. The line ℓ tangent to $y = f(x)$ at P

Solving the tangent problem leads one to investigate limits of functions and, ultimately, to the definition of the derivative of a function.

In this course we'll work to find an appropriate expression for the derivative of a function, become masters at computing derivatives of even the most exotic functions, and see a smattering of application of the derivative. When possible I hope to shed light into the history of calculus so you can come into contact with the ideas that motivated its development and the personalities that fostered its growth.

2. Expectations

2.1. **Prerequisites.** Students in this class need a solid understanding of concepts from high school algebra and trigonometry. These include, but are not limited to, knowledge of standard mathematical notation and vocabulary; comfort with the concept of a function; familiarity with basic algebraic, trigonometric, and exponential functions and their inverses; a master of all things concerning lines (how to compute slope, several ways to write equation for a line); and the ability to manipulate algebraic expressions (i.e., simplify fractions, factor polynomials, etc.). We will spend class time reviewing many of these concepts. Students who fear they do not have a solid background in algebra should see the professor for help.

2.2. **In-class expectations.** Unlike high school math classes, the emphasis of this class will not be on computation alone. Though it sits on a bedrock of algebra, calculus is not itself concerned with manipulation or simplification of expressions. A large part of lecture will be devoted to discussing the concepts which drive calculus, and students are expected to understand both these concepts and their applications.

2.3. **Assignments.** Students are expected to write their assignments cleanly and clearly. Points will be deducted from assignments which are sloppy, illegible, or which contains faulty logic, even if the final answer is correct. Answers which do not include your work will receive zero credit.

3. Grading

Your final grade will be computed using your scores from 2 midterm exams and 1 final exam, your quiz and homework averages, and your attendance.

3.1. **Homework.** There will be one homework assignment due each Friday, with the exception of those weeks when you have an exam (when your homework will be due on Wednesday). Homework will be due fifteen minutes after the beginning of class, and late homework is not accepted. If you must miss class on a day that an assignment is due, it is your responsibility to hand your homework in before the beginning of the class period in which the assignment is due.

Diligence with homework is the best prepartion for all quizzes and tests. Students who can solve homework problems on their own nd in a timely manner will perform excellently in this class. Students are permitted to discuss the homework problems with whomever they like, but must write up solutions by themselves. In particular, this means homework solutions may not be written during office hours or group discussions; students may take notes when discussing problems with other people, but should put these notes away before writing up the homework assignment.

Your homework average is computed by dropping your lowest homework grade and averaging the remaining 8 homework grades.

3.2. **Quizzes.** There will be one in-class, timed quiz per week, except for the first week and on those weeks when you have an exam. Quizzes will last 10 minutes and are given on Fridays. Calculators may not be used on quizzes.

Quizzes test the material covered in the week's homework assignment. Students who feel comfortable with the homework assignment should do well on quizzes, so your best preparation for a quiz is to understand your homework!

Your quiz average is computed by dropping your lowest grade and averaging the remaining 6 quiz grades.

3.3. **Tests.** There will be 2 midterm examinations and 1 final. The first midterm will be held during class on Friday, February 3, and your second midterm will be held during class on Friday, March 3. The location of these exams is yet to be determined, though they will be announced in class. Since the exams are held during class, no students should have conflicts which prevent them from taking the exam during the schedule time. If there are exceptional circumstances which prevent you from being in class on these days, you may be able to reschedule the exam sometime *before* the scheduled in-class exam. Make sure you see the professor as early as possible to report these conflicts so appropriate accommodations can be made.

Your final will be held Monday, March 20 from 7pm to 10pm. The location of the final has not yet been determined, though will be announced in class.

3.4. **Attendance.** More than any other discipline, mathematics requires that a student understand one concept before moving on to the next. Therefore it is critical that you attend this class on a regular basis in order to stay on track with the material we cover. Students with excessive absences will see their grade diminished.

3.5. **Computing your grade.** Your grade is computed as follows:

- `Midterm 1 ..... 20 %`
- `Midterm 2 ..... 20 %`
- `Quiz Average ..... 20 %`
- `Homework Average ..... 10 %`
- `Final ..... 30 %`

4. Resources

4.1. **Office Hours.** Students are highly encouraged to attend office hours to discuss concepts covered in class or ask questions about homework assignments. There are 9 hours of office hours per week for this class.

4.2. **Text.** The course is centered around Stewart's *Calculus: Concepts and Contexts*. Homework assignments will be taken primarily from this book, so students should have a copy of the text for the course. It also provides another source of understanding the course material.

4.3. **Course Webpage and Course Notes.** Homework assignments and practice exams, together with solutions, will be posted at the course webpage `http://math.stanford.edu/~aschultz/w06/math19`. Course notes (pun intended) for the lectures will also be posted; these will cover the material discussed in lecture and should be posted by the end of each lecture day.

4.4. **Tutoring.** The Center for Teaching and Learning offers free tutoring to undergraduates. You can find out more about this at the tutoring webpage: `http://tutoring.stanford.edu`.

4.5. **Your classmates.** Discussing problems with classmates is a great way to hear new ideas for attacking problems. Remember, though, that students must write up homework assignments on their own.

5. Course Calendar

Below is a rough outline of the topics covered in this class.

	Wed, 01/11/06 Welcome to Math 19	*Fri, 01/13/06* Overview of Functions Chapter 1 (except 1.4, 1.7)
Mon, 01/16/06 No Class	*Wed, 01/18/06* Lines and Slope, Introduction to the tangent problem Section 2.1	*Fri, 01/20/06* Introduction to limits Section 2.2
Mon, 01/23/06 Properties of Limits Section 2.3	*Wed, 01/25/06* Continuity Section 2.4	*Fri, 01/27/06* The Intermediate Value Theorem Section 2.4
Mon, 01/30/06 Derivatives (at a point) Section 2.7	*Wed, 02/01/06* Derivatives (at a point) Section 2.7	*Fri, 02/03/06* Midterm 1
Mon, 02/06/06 The derivative of a function Section 2.8	*Wed, 02/08/06* The derivative of a function Section 2.8	*Fri, 02/10/06* Derivatives of Polynomials, Exponentials, Trigonometrics Sections 3.1, 3.3
Mon, 02/13/06 Product and quotient rules Section 3.2	*Wed, 02/15/06* The chain rule Section 3.5	*Fri, 02/17/06* The chain rule Section 3.5
Mon, 02/20/06 No Class	*Wed, 02/22/06* Implicit Differentiation Section 3.6	*Fri, 02/24/06* The Calculus/Geometry Dictionary Section 2.9
Mon, 02/27/06 Local Extrema and Calculus Section 4.2	*Wed, 03/01/06* Analyzing Functions through Calculus Sections 2.9, 4.2	*Fri, 03/03/06* Midterm 2
Mon, 03/06/06 The Extreme Value Theorem Sections 4.2, 4.6	*Wed, 03/08/06* Optimization Problems Section 4.6	*Fri, 03/10/06* Practice with Optimization Section 4.6
Mon, 03/13/06 Linearization Section 3.8	*Wed, 03/15/06* Logarithmic Differentiation Section 3.7	*Fri, 03/17/06* Course Summary
Mon, 03/20/06 Final Exam, 7-10pm		