Multivariable Calculus

In single variable calculus, you learn how to use derivatives and antiderivatives to answer classical questions about functions which take in one real number and spit out another real number. In the jargon of mathematics, these functions are said to have the real numbers (denoted $\mathbb{R}$) as both their *domain* (i.e., set of inputs) and their *codomain* (i.e., set of potential outputs). Math 205 (*Multivariable Calculus*) is a first attempt to understand what derivatives and integrals mean for a function which takes in more than one input, or whose output is more than a single number. That is to say, this class will focus on the calculus of functions $f : \mathbb{R}^n \to \mathbb{R}^m$, particularly when $n, m \leq 3$. Fortunately much of the differential and integral calculus that you remember has natural extensions in this setting. Our goal will be to complete chapters 11 and 13-17 from the text.

1. Course Details

1.1. **Professor.** My name is Andy Schultz, and my preference is that you address me by my first name (no title necessary). My office is on the third floor of the Science Center, room S352. Office hours will be held Mondays from 1:30-3, Wednesdays from 10-11, and Fridays from 10:30-12:25. You are highly encouraged to attend office hours, and you never need an appointment to do so. If these office hours don't fit with your schedule, let me know so that I can either adjust when "official" office hours are held or set up an appointment to help you outside of office hours. Please come to my office or send me an email if you ever want to discuss material from the class or ask about homework problems!

You can contact the instructor at `andrew.c.schultz@gmail.com`. Though he is always happy to receive emails from you with questions or concerns about the course, he can't guarantee that he'll be able to promptly reply to emails late at night or over the weekend. If you do contact the professor by email, please be sure to follow standard email etiquette. In particular, please make sure you include a greeting and signature and avoid abbreviations. If you're contacting him to ask about a problem, please be sure to specify what the problem asks (as opposed to asking something like "I can't get problem 2 and need your help").

1.2. **Text.** The course is centered around *Multivariable Calculus* by Stewart (6th edition); the ISBN for this text is 978-0-495-01163-7. Students will be expected to read from the book in preparation for class each day, and they should treat the book as a helpful reference when attempting to digest lectures. When going through the text on your own, remember that mathematical reading is an active process; it's a good idea to keep some scrap paper on hand so you can perform calculations that the text leaves out, and you shouldn't be discouraged if it takes a few attempts at a passage to understand precisely what the text is saying.

1.3. **Online resources.** You'll be able to access homework assignments, lecture summaries and copies of quizzes online through the course webpage at `http://palmer.wellesley.edu/~aschultz/w16/math205`.

2. Expectations

2.1. **Prerequisites.** Students are expected to have a solid understanding of standard, high school-level algebra and trigonometry. Students are also expected to be proficient in the topics covered in single-variable differential and integral calculus courses. If you find that you are struggling with any of the prerequisite topics, contact the instructor immediately so he can help you get caught up to speed.

2.2. **In-class expectations.** A student's engaged presence is expected in classroom lectures. While the professor is in charge of determining what content is covered during a class period, students share the responsibility of directing lectures and discussion sections so each is as clear as possible. In particular, students should feel comfortable stopping the instructor to ask him to repeat a particular exposition, to present a concrete example of an abstract concept, or to explain a confusing concept in a new way. Classroom time is there for the benefit of students, so should be treated as an interactive resource.

2.3. **Attendance.** Mathematics requires that a student understand one concept before moving on to the next, and since our course moves at a fast pace it is critical that you attend each and every class. If you are going to miss any classes this term, please let the instructor know as soon as possible. More than 1 absence could negatively impact your final grade.

2.4. **Effort.** Many students have the impression that "understanding the material" means instantly knowing how to do problems assigned in the class. On the contrary, most students find they don't truly understand the course material until they have struggled through several attempts at solving problems or understanding concepts. You are expected to exert a good amount of effort in working through the course material, and you shouldn't be discouraged if a certain topic remains elusive when you first encounter it: try some suggested problems, go to office hours, and ask your instructor or friends for help when you need it. The typical student will need to put in between 8 and 10 hours per week on the assigned problem sets. If you find you are consistently spending more than 12 hours on problem sets, please discuss this with the professor so he can help you manage the time you spend on this class more effectively.

2.5. **Academic Integrity.** Students are expected to read and understand the college's Honor Code. Incidents where academic integrity have been compromised will be dealt with severely. Although most students have a good feel for what constitutes a violation of the Honor Code, for this class you will also need to be familiar with the instructor's policy on homework collaboration. Please be sure to thoroughly read and understand the section on homework below to avoid an inadvertent violation of the Honor Code.

3. Grading

3.1. **Homework.** Homework problems will be assigned once per week. Your graded homework will all be completed through the online homework system WebWork. Our WebWork site is `http://maggie2.wellesley.edu/webwork2/MATH-205-01-SP-16/`. There will also be optional homework problems selected from the text which you are highly advised to complete. Be sure to start your assignment early so you have enough time to work through problems which require some creative energy. One homework grade will be dropped when computing your final average.

An important note about collaboration and the Honor Code. Students are more than welcome to work with the instructor, classmates, or a tutor from the Help Room when solving homework problems. If you have consulted with someone in preparing your homework, please include a reference to your collaborators when you submit your assignment. In the event that you have taken notes while working with someone else, you must put these notes away and recreate the solutions on your own when you submit your solutions for the homework assignment. Using notes from a collaboration while writing your homework assignment will be considered a violation of the Honor Code. In addition, you may *NOT* consult a written solution to a problem you're working on (whether it be online or in a book). If you have any confusion about this policy, please talk to the instructor.

3.2. **Quizzes.** There will be in-class, 10-15 minute quizzes given in this course. With the exception of exam weeks and the first week of classes, we will have a quiz every Wednesday. Your quiz average will be computed after dropping your lowest quiz score. Barring extreme circumstances, make-up quizzes will not be given. In general, the material covered on quizzes will include recitation of definitions or theorems learned in class and calculations which should be familiar to students who are up-to-date on the homework.

3.3. **Tests.** There will be 3 midterm examinations and 1 final. All midterms are given during the regularly scheduled lecture period in the regularly scheduled classroom, so there should be no conflicts which prevent you from taking a midterm as scheduled. The first exam will be held on Monday, February 29; the second will be on Thursday, March 31; and the last will be Thursday, April 28. (Note this is the day after the Ruhlman conference. Please plan accordingly.) Your final will be self-scheduled.

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

- `Quizzes ..... 10%`
- `Lowest Midterm ..... 15%`
- `Other Midterms ..... 20% (each)`
- `Homework Average ..... 15%`
- `Final ..... 20%`