

MATH 385 - SPRING 2008

Text: provided by instructor

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Office hours: weekdays 12:20-3:30; or when door is open (call first if you prefer) or by appointment

Prerequisites: Math 160 and Math 250.

Goals: One obvious goal I have for this course is for you to learn some topology. Another, perhaps more important goal, is for you to become more mathematically mature: to increase your ability to recognize and generate correct mathematical arguments, in written and oral form.

Methodology: This course will be taught using the R.L. Moore method. The following is a description of that approach: R.L. Moore was a topologist who taught at the University of Texas for many decades. He was famous because (arguably) he had more students who went on to become successful mathematicians than any other mathematics teacher in history. He had a radical approach to the teaching of mathematics. He carefully designed axioms, definitions and conjectures so that his students could learn by studying the axioms and definitions and proving or disproving the conjectures. There were no lectures. Instead, students presented their arguments in class and Moore and classmates critiqued the presentations (in a constructive, non-threatening way.) Students who had not solved or given up on a problem were encouraged to leave the classroom during the presentation of a solution. Students were not to get help from books, people, or any other source other than Moore. Only correct and complete answers received credit. A student stymied on a problem could receive partial credit (for a correct and complete solution) after getting one or more hints from Moore. However a familiar quote students would hear from Moore was "The less I say the more you learn."

Point-set topology was the first college math course I took other than calculus. I was taught using the R.L. Moore method. I confess I felt totally confused for about two weeks because I had never had experience with an abstract math course before. But ultimately this was the pivotal course of my educational experience. I discovered that proving theorems was fun! This course convinced me that I wanted to be a mathematician.

Materials: I strongly recommend that you maintain a "topology notebook," a loose-leaf, 3-hole-punch bound notebook partitioned into 4 sections. Section 1 is the text/problems you receive from me. Section 2 is a list of the axioms, definitions and central theorems encountered so far in the course, stated in your own words, perhaps with examples or other clarifying text. This is the material you are responsible for and the material you can build upon to do subsequent work. Section 3 consists of your polished, written proofs, examples or counterexamples for the theorems, problems and questions given to you. In each case, you should first state the theorem, problem or question in your own words and then provide the appropriate answer (always with complete justification--not just vague argument, guess or opinion! It is better to **NOT ANSWER** than to cast doubt on your mathematical understanding of proof with an inadequate answer.) You may or may not want to use a separate page per problem. You will be required to submit your work as evidence that you solved a problem

as it comes up in class discussion. Section 4 is for the scratch work you do while trying to solve problems. Sections 2 and 4 are your evidence that you are trying to do the work of this course.

Grading: I will follow the R.L. Moore method. There will be no tests, quizzes or final exam in this course. Your entire grade will be based on your performance on homework and class participation. To get a C in the course, all you need to do is try, as indicated by your knowledge of axioms and definitions and your attempts to do the homework problems. To get a B in the course you should get to the point where you can write down and explain routine proofs with good style and without making logic errors. To get an A in this course you also need to enjoy success on some non-trivial proofs.

What to expect: This course will be run as a seminar. Although I may sometimes try to put the axioms, definitions and theorems into perspective so that you won't lose sight of the forest amid the trees, most class time will be spent by you and your classmates presenting your solutions to problems. I expect mistakes will be made during presentations, especially at first, and I expect you and your classmates to be supportive of each other and to understand that that is one of the important ways in which we all learn.

When it comes time to discuss a problem (theorem, problem or question) in class you have 3 options: 1) If you believe you have a correct, complete, polished answer to the problem written down, you may submit the written answer to me. Then you will be in the pool of students who may attempt an oral presentation of the problem to the class. A successful presentation will result in additional credit on the problem. 2) You may give up on the problem (hopefully after a noble attempt, perhaps even after being given hints by me.) Then you can still get some (minor) credit by showing me your unpolished attempts and/or by calling attention (in a polite, constructive way) to a flaw in an argument presented by another student. 3) You may ask for more time, and leave the room temporarily if someone else presents a solution to the problem.

To receive credit for this course you will be required to sign the following **contract:**

I promise that I will not give help to my classmates, that I will not receive help from any source other than my instructor, that I will strive to do my best work, that I will not turn in work which I know is not correct and complete, and that I will help to create a supportive classroom atmosphere in which my classmates will feel comfortable.

signed _____