

Math 203, Proving Things: Algebra, Spring 2020

Course Information

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| Instructor: | Henry Towsner |
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| Office: | 4N51 |
| Office Hours: | Tuesday, 1:30-3 and Wednesday, 12:30-2, or by appointment |
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| TA: | Kamron Vachiraprasith |
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| Final Exam: | <i>Tentatively</i> Monday, May 4, 9am-11am |

Textbook

The textbook for this class is *A TeXas-Style Introduction to Proof*, by Ron Taylor and Patrick X. Rault. It is absolutely necessary for every student to have access to a copy. A copy is on reserve in the Math/Physics library on the 3rd floor of DRL.

Course Objectives

The focus of Math 203 is learning foundational skills for working with mathematics: how to read, write, and understand the mathematical content that appear in upper-level mathematics courses. Students will learn:

- how to read mathematics, including:
 - how to interpret a new definition,
 - how to read theorems,
 - how to read proofs critically, including identifying mistakes and filling in gaps,
- how to write mathematics, including:
 - how to write in \LaTeX , the standard software for writing mathematics,
 - how to write clear mathematical proofs,
- proof techniques, including:
 - direct proofs,
 - proof by contradiction and contraposition,
 - induction,
- important concepts that recur in many courses, including:
 - propositional logic,
 - set notation,
 - relations, and
 - counting.

Daily Work

For almost every class, you will have a four part assignment, which will be posted on the class website.

- Reading: read the assigned material at least once, and more times as necessary. Reading mathematics is an active process: only read while you have the ability to write notes simultaneously, working through details and writing down questions as you go.
- Repond to the reading: write down questions or comments you have as you read, such as: concepts that are confusing, connections to other ideas, examples, misconceptions that have been clarified, and so on. Additionally, write responses to the assigned reading questions.
- Exercises: these will be introductory or warmup problems; work on them individually, possibly consulting with me or the TA outside of class. Be prepared to present some of these in class—even if you're not completely sure of your answer.
- Homework problems: these will typically be more difficult problems which you will work on after we have covered the material in class. These will be due in class on Thursday the week after we cover the material. You should work on these on your own, but may consult with your classmates, the TA, and me. Write your solution entirely on your own, without comparing it to other people's solutions.

We will be working towards typing the assignments in L^AT_EX. By the second assignment, you must be typing at least one problem per week using L^AT_EX.

Proof assignments that receive less than a 4 in either of the two rubric categories (later in this syllabus) must be revised and resubmitted by the following week. You may choose to revise others as well. The revised score will replace the original score *except* that a 5 will be recorded as a 4.5.

As the purpose of the course is to learn proof techniques, the results you will be proving in this class are generally well-known results that have been proven. For this reason, the only resources you are allowed to use in completing assignments is our course textbook and talking with your classmates, me, or your TA. When you do discuss a problem with someone else, you must give credit to them by writing their name(s) in the margin next to your solution.

In Class Work

Much of our time in class will be spent discussing the reading, presenting solutions to problems, and working on problems in group. This means you need to come to class *every day* having read the assigned material and made an attempt at solving the exercises.

Writing Project

During the second half of the semester, you will put together a more substantial writing project. We will spend some time in class discussing what this is and what is involved.

Grades

Your final grade will be based on: reading responses and exercises (10%), in-class presentations and participation (15%), recitation participation (5%), recitation quizzes (5%), homework problems (30%), writing project (15%), final exam (20%).

Quizzes

There will be a short quiz during each recitation. The quiz will be based on the reading from the previous week, and will check that you know the definitions we've been learning and how to apply them.

Special Accommodations

If you have a documented disability for which you are or may be requesting an accommodation, you are encouraged to contact Student Disabilities Services as soon as possible, and within the first two weeks of the course.

Rubric

Written assignments: The following rubric will be used for proofs. For written problems which are not full proofs, the rubric will

| Proof rubric | 5 | 4 | 3 | 2 | 1 |
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| Reasoning | Correct proof techniques are selected and applied correctly and clearly; no gaps. | Correct proof techniques are selected and applied correctly and mostly clearly; some details might be unclear or skipped. | Basically correct proof techniques, but not always applied correctly, or significant gaps or mistakes in logic. | Significant mistakes in application of proof techniques or logic. | An effort, but no appropriate use of proof techniques and reasoning is mostly incorrect. |
| Writing | Proof is written clearly and is organized well; notation is chosen well. | Proof is written clearly and could be understood by peers; some choices in organization or notation which could have been improved. | Proof requires significant effort to understand: significant gaps, or poor organization or notation. | Some correct portions, but major areas of imprecision. | No real progress towards a proof. |

Presentations

Presenters will be volunteers or chosen randomly (with some effort to space them out evenly) each day. In general, you should be prepared to present every day, but twice during the semester, you may "pass" for that day without a penalty. They will be graded based on whether you have come prepared and make a good faith effort. You do *not* need to present a perfect or totally clear solution immediately: it's the job of the class *collectively* to work with you on refining it.