

Math 290–001 (Introduction to Advanced Mathematics)
Fall 2017

Instructor: David Walnut

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Office hours: TR 10:30am–12:00pm, and by appointment.

Text: D. Smith, M. Eggen, R. St. Andre, *A Transition to Advanced Mathematics* (eighth edition)

Topics: The course will cover portions of Chapters 1–5 in the text.

General Comments:

The main purpose of this course is to teach the student how to write, read, and recognize correct mathematical proofs. Along the way, the student will be introduced to some elementary concepts of advanced mathematics including elementary propositional logic, set theory, relations, functions, and cardinality.

This course has been designated by the Math Department as a writing-intensive course. Therefore much emphasis will be laid on correct grammar, good organization and clarity of expression as well as correct logic in all graded work.

The class will be taught using a partially “flipped” format. This means that most of the lecture material in the course will be done outside of class and most of the class time will be spent on collaborative group work. Recorded lectures will be made available through BlackBoard.

A BlackBoard page will be set up for this course. This page will contain announcements, handouts, solutions to exams, class notes, and other important information. You should check BlackBoard regularly to avail yourself of these helpful resources.

You are required to be familiar with some flavor of the mathematical typesetting software TeX, such as LaTeX. You are not expected to come in with this familiarity, but it is required that you typeset solutions to the homework sets using TeX. More details on this will be available on the BlackBoard page for this course.

This class is identified as a Students as Scholars Scholarly Inquiry course. Through the individual written assignments and group work, emphasis will be placed on learning the type of thinking that is involved in understanding advanced mathematical concepts, and in furthering the mathematical enterprise. This includes learning how to formulate conjectures and proof strategies based on evidence gathered from examples, and special cases. In addition, the student will learn the value of the proper formulation of a definition. All of these are basic skills required to understand the motivations and techniques that inform all mathematical research. Finally, students will learn how to write mathematics using the TeX software package which is how virtually all professional mathematics is written.

Grading:

Homework Exercises: Included with this syllabus is a list of homework exercises for the course taken from the exercises at the end of each section of the book. Students are expected to

complete these homework problems in a timely fashion as the corresponding sections are covered in class. These exercises will not be collected. Collaboration is *encouraged* on these assignments.

Graded Writing Assignments: There will be approximately 10 short writing assignments given throughout the semester. The assignments will involve writing mathematically and grammatically correct solutions to problems, usually involving proofs. Your grade for these assignments will be based on the correctness of your proofs and clarity and correctness of your writing. You will receive feedback on your writing assignments which will total at least 3500 words according to the guidelines of the Writing Across the Curriculum Committee. Precise assignments and due dates will given on BlackBoard. Collaboration is **not permitted** on these assignments.

The student should be aware of the following requirements for all homework sets:

- No late assignments will be accepted under any circumstances.
- All assignments are to be typed up using some flavor of TeX, such as LaTeX, and are to be submitted to me electronically through BlackBoard as a *pdf* file (no other file format is acceptable).

If any one of these rules is violated, the assignment will not be accepted. *You have been warned.* The average of your written homework assignment scores will count for 40% of the final grade.

Collaborative Work: Each class period, there will be assigned several problems whose solution will take the form of collaborative work done primarily in class. The work will be done in groups of no more than three that either I will assign or that you will choose. Some class periods there will be a new assignment given and in others you will be asked to finish the assignment given out previously. You will be asked to write up the solutions you come up with *as a group* and submit them. These submissions will be subject to the same requirements as the homework assignments in the previous item and will be graded in the same way. Your average score on these assignments will count for 25% of the final grade.

Midterm Exams: One midterm exam will be given which will take the full class period, on Tuesday November 7. The midterm exam will count for 15% of the final grade. Makeup exams will be given only in cases of extreme hardship and then only when the student has **contacted me in advance**. If I am not contacted in advance, no makeup will be given.

Final Exam: There will be a **cumulative final exam** given on Thursday, December 14, 2017, 7:30am–10:15am in the same room where we have class. The final exam will count for 20% of the final grade.

The grading scale is as follows, and is based on your correctly rounded semester average. There will be no curve.

A+:	98+	A:	93 - 97;	A-:	90 - 92;
B+:	88 - 89;	B:	83 - 87;	B-:	80 - 82;
C+:	78 - 79;	C:	73 - 77;	C-:	70 - 72;
D:	60 - 69;			F:	0 - 59

Homework Exercises

Section Exercises

- 1.1 1(a)-(e), 2(a)-(f), 3(a)-(g), 4(a)-(g), 5(a)-(c), 6(a), 6(d), 8(a)-(b), 10(a)-(c)
- 1.2 1(a)-(e), 2(for parts (a)-(e) of 1), 3(a)-(d), 4(a)-(e), 5(a)-(d), 6(a)-(c), 12(a)-(c), 16(a)-(d)
- 1.3 1(a)-(e), 2(for parts (a)-(e) of 1), 5, 8(a)-(e), 10(a)-(d)
- 1.4 3, 5(a)-(e), 6(a)-(d), 7(a)-(e), 9(a)-(b)
- 1.5 3(a)-(d), 4(a)-(c), 6(a)-(b), 7(a)-(c)
- 1.6 1(a)-(f), 2(a)-(c), 4(a)-(e)
- 1.7 1(a)-(f), 2, 3(a)-(e), 5(a)-(e), 7(a)-(b), 8(a)-(c), 9(a)-(c)
- 1.8 6(a)-(c), 7(a), (b), (d), 9(a)-(b), 10, 11, 13, 15, 17(a)-(c)
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- 2.1 1(a)-(e), 4(a)-(e), 5(a)-(g), 6(a)-(c), 7, 8, 9, 14(a)-(d), 15(a)-(g), 17(a)-(f)
- 2.2 1(a)-(e), 2(a)-(e), 6(a)-(e), 9(a)-(d), 10(a)-(c), 11(a)-(c), 15(a)-(d), 17(a), (b)
- 2.3 1(g), (i), (n), (o), (p), 7, 8, 9(a), (b), 10, 16(a)-(c)
- 2.4 1(a)-(c), 2(a)-(c), 4(a)-(e), 5(a)-(c), 6(a)-(c)
- 2.5 1(a)-(c), 3, 2, 5(a)-(b), 7(a), (b), (d), 9, 13(a)-(b)
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- 3.1 1(a)-(b), 2(a)-(e), 6(a)-(d), 7(a)-(c), 8(a)-(d), 9(a)-(d)
- 3.2 1(a)-(e), 2(a)-(d), 5(a)-(b), 6(a)-(c), 8(a)-(c), 11, 15(a), 17, 18
- 3.3 2(a)-(c), 3(a)-(c), 4(a)-(c), 6, 10
- 3.4 3, 8(a)-(b), 9(a)-(b), 10
- 3.5 1(a), (b), (c), (f), 2(a)-(c), 3, 4, 8, 9(a)-(b)
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- 4.1 1(a), (b), (d), (i), (j)-(e), 13(a)-(c), 14(a)-(c), 15(a)-(c)
- 4.2 5(a)-(b), 9(a)-(b), 12
- 4.3 1(a)-(f), 2(for parts (a)-(f) of 1), 4, 5, 6, 9(a)-(d), 12(a)-(b)
- 4.4 1, 3(b), (d), 4, 5(a), 6, 8
- 4.5 1(a), 2(a)-(d), 4(a)-(d), 7(a)-(c), 10(a)-(b), 12(a)-(c), 13(a)-(b), 14(a)-(b)
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- 5.1 4, 7(a)-(b), 8(a)-(b), 10, 12, 13, 17, 18(a)-(b), 19(a), (e)
- 5.2 1, 3(a)-(c), 4(a)-(c), 10, 11
- 5.3 5(a), (b), (d), 6, 7, 9(a)-(c), 11, 12(a)-(b), 14(a)-(b)2, 8(a)-(c), 10, 12, 13(a), 14(a)-(b)
- 5.4 3(a)-(b), 4(a)-(c), 5, 7, 9(a)-(c), 13(a)-(c), 11, 15
- 5.5 1(a)-(d), 3, 5, 8