

Math 1010-7 – Intermediate Algebra

Instructor: Anna Macquarie

Class meetings: MTWF 8:35am - 9:25am WBB 207

Office Hours: TF 9:30am - 10:30am (right after class on Tuesdays and Fridays)

Office Location: Leroy Cowles Building loft (4th floor)

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Materials:

- Text: *Intermediate Algebra*, 5th edition, by Larson and Hostetler (ISBN 9780547102177) – bookstore has 50% guaranteed buyback program even on used textbook (buy used one for \$153 and receive \$92.5 at buyback: total cost \$60.5). They also carry a digital book that is about \$40 cheaper than a used book.
- Supplementary notes available on www.math.utah.edu/online/1010
- Clicker response card by Turning Technologies to be purchased in the bookstore. We recommend that you purchase the NXT response card.

Course Objectives: The essence of algebra is to use variables instead of just numbers. This enables us to describe things in general rather than in particular, it helps us set up and solve problems, and it is instrumental in constructing a link between formulas and pictures which in turn much amplifies our problem solving ability. During this class you will become used to the idea of having variables represent parameters and unknowns, and will become competent at simple algebraic manipulations. You will learn how to apply the basic techniques of solving linear and quadratic equations. Your repertoire of functions will increase to include rational, exponential and logarithmic functions. Throughout the course you will be using mathematics to solve problems which originate in the world around us.

Why This Class Is So Weird: Attendance counts, and the structure is "flipped".

- Attendance is taken daily with clickers.
- You are to read the text or watch videos online (posted on Canvas) before class. You will have a short clicker quiz on the material you read/watched, every session.
- Class time will be spent working on problems and fine-tuning your understanding.

Weekly Homework/Quizzes: I will assign weekly homework that will not be collected. However, there will be a written quiz administered every Friday (except on the weeks of the midterm), which will be entirely, and verbatim, taken from the assigned homework. Ensure you do the problems and that your questions from the homework are addressed and answered. *Your two lowest written quiz scores will be dropped.*

Midterms: There will be three midterm exams and a final comprehensive departmental exam at the end of the semester. **Make-up tests will not be allowed.** Make sure to communicate timely about any conflict you may have with the announced dates.

Tutoring Lab: T. Benny Rushing Mathematics Student Center offers FREE tutoring (adjacent to JWB and LCB), RM 155

M - H 8am - 8pm, F 8am – 6pm, closed Saturdays, Sundays and holidays.

They are also offering group tutoring sessions. If you're interested, inquire at the

<http://www.math.utah.edu/ugrad/tutoring.html>

The University Tutoring Center, 330 SSB, offers inexpensive (\$6/hour) private tutoring. A list of private tutors is also available from the Math Department office.

Computer Lab: Also in the T. Benny Rushing Mathematics Student Center, RM 155C.

M – H 8am – 8pm, F 8am – 6pm. You can print all the course materials there for free (if asked note that it is for your MATH1010 class).

Calculators: You are welcome to use a calculator on your homework, but there will be **NO calculators allowed on any of the exams**. So you should try doing your homework without a calculator, for practice.

Grading: The grades will be calculated as follows:

- Attendance and Reading Quizzes 20% (assessed by Clickers)
- Weekly Quizzes 15 % (Written, every Friday)
- Midterms 35% (Three total)
- Final Exam 30% --- You have to take the final to pass the course!

Canvas: All the course materials can be found on Canvas (<http://learn-uu.uen.org> or access via CIS). You will find your grades there as well. To log in, you use the same student id and password that you use for Campus Information System. Ill do my best to update the grades on a regular basis and keep everything accurate.

Grading Scale: The grade scale will be the usual:

A (93-100), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D+ (67-69), D (63-66), D- (60-62), E (0-59).

Midterms: Exam 1: 9/12/12 Exam 2: 10/17/12 Exam 3: 11/14/12 Final: 12/11/12, 3:30 — 5:30	Other dates: Drop date: 8/29 Withdraw date: 10/19 Holidays: 9/3, 10/7-14, 11/22-23	Reading quiz given every class (clickers)
		Written Quiz given every Friday (taken from homework)

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the [Center for Disability Services](#), 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

Other Policies:

- Cheating is completely unacceptable. If you cheat on any homework, project, quiz or exam, I will automatically give you a zero for that grade. If you cheat again, I will give you a zero for the entire course. In all cases of cheating, I will also report the incident to the Dean of Students. Additionally, if an international student cheats, I will also report the incident to the International Students Office.
- Turn your cell phones OFF. Not only is this a matter of courtesy, but a phone is considered a calculator.
- There will be no retakes of exams...ever. Your score is what you get.
- You may take an alternate exam if you talk to me about it first and explain the extenuating circumstances that make it necessary. Needing to work, babysitting your siblings, oversleeping, or needing more time to study do not pass as acceptable. Getting in a car crash or having to attend your child's birth, on the other hand, is sufficient reason to request to take an alternate exam (I reserve a right to ask for a written evidence of any claims you make). But, it is 100% your responsibility to communicate with me as soon as is possible, before the exam occurs. **Talking to me after the exam will be sufficient reason for you to receive a zero on that test.** I reserve the right to make alternate exams more difficult than the scheduled exam.

Course Outline:

See the tentative schedule of topics and homework exercises. Remember that the Friday quiz questions come verbatim from this list:

1010 INTERMEDIATE ALGEBRA HOMEWORK CHART

SEC	Topic	Problems from Text
Ch1	Fundamentals Of Algebra	
1.1	The Real Number System	3,7,11,13,17,23,33,47,65,69,77,85,89
1.2	Operations With Real Numbers	7,13,19,29,45,57,67,71,77,91,93,109,121
1.3	Properties Of Real Numbers	5,7,11,17,21,31,33,47,57,59,73
1.4	Algebraic Expressions	1,9,13,17,21,23,25,33,45,51,53,65,73,99
1.5	Constructing Algebraic Expressions	1,7,13,19,25,31,37,45,47,51,57,59,69,79
CH2	Linear Equations And Inequalities	
2.1	Linear Equations	1,5,7,9,11,15,17,23,29,35,37,47,53
2.2	Linear Equations And Problem Solving	3,5,11,19,23,29,35,55,59,65,69
2.4	Linear Inequalities	1,3,5,9,11,21,27,37,41,55,61,71,75,79,83
2.5	Absolute Value Equations And Inequalities	1,3,7,11,13,21,27,35,37,45,53,65,87,89
CH3	Graphs And Functions	
3.1	The Rectangular Coordinate System I. Plotting An Equation II. Midpoint And Distance Formulas	1,9,15,19,23,27,31,35,41,55,59 61,67,69,79,83,87
3.2	Graphs Of Equations	1-6,11,19,27,35,41,45,49,57,95
3.3	Slope And Graphs Of Linear Equations I. Slopes II. Parallel And Perpendicular Lines	1,3,57,15,19,23,25,31,33,35,43,53,57,61,71 75,77,79,81,83,85
3.4	Equations Of Lines I. Writing The Equation Of A Line II. Horizontal, Vertical Lines, Applications	1-4,5,13,19,25,35,39,42,51,55 59,61,63,65,73,87,89
3.6	Relations And Functions I. Relations, Functions ii. Evaluating, Piece-Wise Functions, Domain	1,5,11,15,17,23,25,29,33 43,47,51,53,59,31,67,69,77
3.7	Graphs Of Functions I. Graphs Of Basic Functions II. Transformations	1,5,11,19,25,33,43,45,47,55,63,65
CH4	Systems Of Equations	
4.1	Systems Of Equations I. Solving Systems II. Applications	5,9,11,13,17,29,39,47,55,61,71,75 95,97,105,113
4.2	Linear Systems In Two Variables	3,7,11,17,23,27,35,41,51,53,63,71
4.3	Linear Systems In Three Variables	1,3,7,11,17,27,41,47
CH5	Polynomials And Factoring	
5.1	Integer Exponents And Scientific Notation	3,5,11,15,19,25,29,35,49,55,61,67,83,91,93 103,107,111,113
5.2	Adding And Subtracting Polynomials	5,9,11,15,17,21,23,29,31,35,47,53,55,65,71 75,85

5.3	Multiplying Polynomials	7,9,17,21,25,31,35,41,49,55,61,71,77,85
5.4	Factoring Polynomials	5.4: 17, 19, 27, 29, 47, 49, 61, 63, 71, 73, 89, 91, 137, 141
5.5	(continues on next page)	
5.5	(continued from previous page)	5.5: 7,13,25,31,37,45,51,57,63,67,77,87,93,99, 111,129,131
5.6	Solving Polynomial Equations By Factoring	3,9,15,25,37,47,61,75,97,99,101
CH6	Rational Expressions, Equations And Functions	
6.1	Rational Expressions And Functions	3,9,13,15,23,27,29,47,55,61,75,83,
6.2	Multiplying And Dividing Rational Expressions	3,7,11,23,25,27,31,37,47,49,63,67
6.3	Adding And Subtracting Rational Expressions	1,7,13,17,23,31,41,47,51,63,77,81
6.5	Dividing Polynomials	1,5,11,15,19,25,29,37,41,49
CH7	Radicals And Complex Numbers	
7.1	Radicals And Rational Exponents	1-127, Every other odd (1,5,9,...)
7.2	Simplifying Radical Expressions I. Simplifying Rationalizing denominators	5,7,13,17,19,23,27,29,33,35,43,49,53 55,59,67,69,71,73,77
7.3	II. Adding And Subtracting Radical Expressions	7,13,15,23,25,29,35,39,47,51,53,61,65
7.4	Multiplying And Dividing Radical Expressions	9,13,23,29,37,41,49,53,57,95,73,75,81,85,93
7.5	Radical Equations And Applications	3,11,21,27,31,33,39,47,53,55,61,73,81,83
7.6	Complex Numbers I. Adding And Subtracting II. Multiplying and Dividing	1,5,15,19,27,35,43,51,55,57,63,65 71,77,85,99,103,111,119,123,135,137
CH8	Quadratic Equations, Functions, Inequalities	
8.1	Strategies For Solving Quadratic Equations	
8.2	I. Two Strategies	8.1: 5,13,23,27,39,65,75,101
8.3	II. Completing The Square	8.2: 3,9,17,21,29,33,41,53,59,87
	III. The Quadratic Formula	8.3: 5,9,15,21,27,32,49,55,61
	IV. General Strategies	
8.5	Applications Of Quadratic Equations	8.5: 11,13,15,19,41,43,47
8.6	Solving rational equations	6.6: 23, 25, 37, 39, 45, 47, 61, 63, 81,85
CH9	Exponential And Logarithmic Functions	
9.1	Exponential Functions	23,31,33,35,37,47,48,49,88,93
9.2	Composite And Inverse Functions I. Composite Functions Inverse Functions	3,7,11,18,21,43,45,55,63,67,107
9.3	Logarithmic Functions	1,5,9,13,17,19,23,27,31,35,37,40,43,57,61,131-136
9.4	II. Properties Of Logarithms	1-112 Every other odd (3,7,11,...), 129
9.5	I. Solving Exponential And Logarithmic Equations II. Applications	9.5: 3,11,15,21,39,67,83,93,105,109,131 9.6: 1,9,13,47,51,55,73,75
	Tying loose ends	
	REVIEW for FINAL EXAM	

The following set of notes has evolved over the years and contains proven suggestions that will enable you to succeed in this and future math classes. Your first assignment is to read every word in the remainder of this syllabus, and take to heart everything you read.

Find Study Partners: One of the most enjoyable aspects of studying at a University is that you have a chance to meet new people and be exposed to new ideas. I recommend that you form or join a group of your fellow students, and that you meet with your group on a regular basis to study and work on the home work. It's okay if you and your partner or partners have different levels of experience or ability. One of you will benefit from explaining something and the other from having something explained again in a different way. To find study partners you can of course just look around and ask your neighbor in class. Don't be shy, you are all in the same boat, and the worst that can happen is that your neighbor says no. Another way to form groups is to list your desire and availability on Discussions page in canvas.

University versus High School Classes: Some mathematics (essentially Intermediate Algebra through Calculus and some basic statistics) are taught at High Schools as well as at a University like this one. There are two main differences between classes on the same subject taught at a University or a high school. The University class is faster paced, and at a University there is no supervision of your learning by the teacher. I will frequently make suggestions about how you should go about it, but you are in charge of your learning. This is a difference in philosophy, not a matter of not caring. I measure my success by seeing how much students in this class learn, but I assume you are fully responsible and capable to make the best of what this class has to offer. I'd be pleased to talk with you about ways of maximizing your success. Don't hesitate to contact me before or after class, or by e-mail if I can be of assistance.

What it Takes: Taking any math class is a serious enterprise that requires your commitment, time, and energy. Obviously, we are all busy, and there are many competing claims to our attention, all of which are legitimate. So it's not a moral problem if you don't have enough time to dedicate to this class. But it is a fact of life that understanding new mathematics takes a great deal of time and effort, and if you are not prepared to spend that time and effort you will not understand the mathematics. As a guide-line, when taking a math class, you should count on spending about three hours out of class studying and doing homework, for every hour in class. So for this 4 unit class you should count on spending a total of about 12 hours per week, approximately and on average. Moreover, you should be able to spend that time in good sized chunks without distractions. A student once told me that essentially the only time she had to study was when she was stuck in traffic or stopped at a red light. She seemed sincere, but obviously she had no clue about learning mathematics. If you are unable to spend that kind of time, you are better off taking Intermediate Algebra during another semester when you do have the time.

I'm not a math person: Many people feel they are intrinsically unable to learn mathematics. This feeling is usually sincere, but it's also irrational, a poor excuse, and unnecessarily self-limiting. You may not be able to make mathematics your career, but you can study mathematics successfully!

Make sure you have the prerequisites: Mathematics proceeds in a logical sequence, and you can't understand new mathematics if you don't understand what underlies it. For this class this means you must understand basic arithmetic, including the arithmetic of fractions, equalities, and inequalities.

Make sure you do not fall behind: This is the most important suggestion in these pages! Once you fall off a moving train there is no way to get back on. If you miss just one key idea you will not properly understand what we are doing and your subsequent time and effort will be wasted. Saving two hours today may result in wasting days and weeks later.

Come to class each time: I will keep reminding you of the big picture, point out what parts of the subject are crucial, explain the key ideas, and make suggestions for your study. If you have to miss class on occasion make sure you study the relevant web pages, notes, videos and ask a friend or myself what happened in class.

Before attending class: read the relevant material, watch the relevant videos. Enabling you to do this is the main reason for giving you the tentative. You will receive updates if the schedule changes. Even if you don't

understand everything at your prior reading, the discussion in class will be much clearer for you, and overall you will save time.

After attending class: make sure you understand what we did. Go over your notes, do examples, work the exercises, think about the big picture, question assertions made in class or on the web pages, try different arguments to get the same result, check things for plausibility and consistency.

Seek Help: Work with friends or study partners. Use our free tutoring service in the Math Center. You are welcome to ask me questions at my office hours or set up a special appointment. Focus on understanding the subject rather than memorizing recipes for doing simple things. You understand a piece of mathematics if you can explain it in terms of simpler mathematics; you can make multiple logical connections between different facts and concepts, and you can figure out how to apply the mathematics to solve new problems. Too much teaching of mathematics is directed towards memorizing and rehearsing the application of simple recipes to narrow classes of problems. Focusing on the underlying connections and learning how to figure things out is vastly more efficient and empowering than trying to memorize countless formulas.

Exercises: You can learn mathematics only by doing mathematics in the context of a class like this. As you advance you will find that there are better ways to learn a subject than taking a class. For example, you read literature, you work on an involved problem that calls for techniques you need to learn, or you write a thesis, paper, or book. Another way of learning a subject in depth is to teach a class on it, this means you work exercises. In this class you will of course do many exercises in the context of homework, but you have to go beyond that. Which and how many additional exercises you should do depend on your background, your current understanding, and your interests. The best way to find good exercises is to make them up yourself, but there are also a great many exercises in any textbook on Intermediate Algebra, ranging from very simple problems letting you practice just one specific technique to quite sophisticated and deep questions. But don't hesitate to make up your own exercises!

Simplify Your Problem: A major problem solving technique that is often ignored by students is simplification. You will not solve a difficult problem on the first attempt. When a problem seems hopeless, then simplify it until you reach a problem that's still related to the original problem but that you can solve. Then solve the simpler problem and use what you learned in the process for the solution of the more difficult problem.

Always Check your Answers: Everybody makes mistakes, and you simply have to recognize that fact and guard against it. You should always check your answers. The answers to odd numbered problems are in the book, but that should not discourage you from working even numbered problems or making up your own. If you are not sure of an answer to an even numbered problem, or one you made up, talk to me. You can check your answers by computing the same result in different ways, by checking for plausibility and consistency, or by using more specific techniques such as substituting in the original function or equation, drawing a graph, or making sure that physical units are consistent. (For example, if your analysis calls for adding two seconds to a square foot then something must have gone wrong.)

One major checking technique deserves its own paragraph:

Always Have Expectations: Before you enter into any calculations think about what kind of answer you expect. When you are through, compare your answer to your expectations. There are several possibilities. Your answer may meet your expectations. That's great; it will give you a warm and gratifying feeling, even though you may not have learned a lot.

If the answer differs from your expectations then there are two possibilities: you may have made a mistake and you are now alerted to that fact, and you can figure out what went wrong. Or, and this is the most exciting case, there is something you misunderstood before you began work on this problem, and now you can improve and correct your understanding, and learn something new!

Hostile Testing: When checking your answers, to be effective in finding errors, apply what the air and space industry calls hostile testing. This is not the testing we inflict upon our students! This means that you approach your answer with the expectation that it's wrong and you try to prove that it is wrong. That way, if you fail, then maybe your answer is actually correct! Apply the same attitude to our online material and to what your teacher tells you. (If you think I'm making a mistake in class, don't hesitate to speak up!) You are more likely to find

errors, and you end up processing what you read or hear with a much higher degree of awareness and effectiveness.

Language: Part of learning mathematics is learning the language of mathematics, and mastering the language is essential for understanding mathematics and communicating it to your peers and others. Make a habit of having the web pages and a standard dictionary handy, and when there is a word you don't understand figure out what it is before you read on. This will cost you some time at the moment but in the long run it will save you time, and it will help you understand the subject much better. It will also make you a more effective problem solver and communicator.

How to Work: You are probably familiar with a mode of mathematics teaching that goes like this: Here is how you solve a quadratic equation, now go and solve 100 problems in your textbook. This is not productive because it turns home work into a chore that needs to be gotten over with, but that is neither enjoyable nor useful. It is much better to solve only a few problems but to go about them deliberately and carefully, with an eye towards noticing what the problem teaches you, and a determination to solve the problem correctly and to understand every detail of it. It is also important to organize your work in such a way that you can go back and see what you did and figure out what you did wrong. Watch what I write on the board and arrange your work similarly.

How to take Exams: There is only one fundamental way to prepare for an exam: make sure you understand the material. Rather than worrying about what specific problems might or might not be on the test, just make sure the mathematics covered by the test make sense to you, following the suggestions above. Here are some more suggestions specifically with respect to exams: Cramming does not work. That is particularly true in mathematics. Instead study steadily throughout the semester, and relax and do something fun the day or the night before the exam. It seems there's always someone late for an exam. It may be a trite thing to say, but that's counterproductive. Make sure you come to the exam on time and unflustered by having to rush and worry. Just allocate a little more time to coming to class than you would normally. When you actually receive the exam, relax, and read all the instructions and all the problems before you start working on any of them. Then do those problems that are easy or obvious. Not only does that give you a good start but also it may teach you or remind you of something that's useful for the other problems. There is rarely a good reason to do the problems in exactly the sequence in which they appear on your piece of paper. If you get stuck put that problem aside and return to it after you are done with the more tractable problems. When you are through and there is time left, don't leave! Instead, check your answers and make sure they are correct. You've spent a lot of time and money getting to the stage where you are taking that exam, and a lot is riding on it. Being able to correct a mistake you made far outweighs the benefits of being able to spend 20 minutes more on whatever else you like to do. Even if you feel you don't understand a question, or several questions, at all, don't just leave. Write what you do understand and spend all the time you have available trying to figure out even those problems that appear hopeless. After the exam go over the answers (which should be provided soon after the test). The exam is not an end in itself, you are here to learn the subject and reading and thinking about problems you have just wrestled with is extremely helpful in this process.

Study-Guide: Go to google, type in the phrase "understanding mathematics", and click on "I'm feeling lucky". This will resolve all your math issues.

Finally: **Welcome to class and I hope you have an enjoyable and productive semester!**