### Week 1
- **M 08/21/23** - Introduction and technicalities (hw 1 op.)
- **T 08/22/23** - Review of Math 1210
- **W 08/23/23** - More review
- **F 08/25/23** - The natural logarithmic function (6.1)

### Week 2
- **M 08/28/23** - Inverse functions and their derivatives (6.2) (hw 2 op.)
- **T 08/29/23** - The natural exponential function (6.3)
- **W 08/30/23** - General exponential and logarithmic functions (6.4)
- **F 09/01/23** - Exponential growth and decay (6.5)

### Week 3
- **M 09/04/23** - NO CLASS (hw 3 op.)
- **T 09/06/23** - Approximations of differential equations (6.7) (hw 1,2 cl.)
- **F 09/08/23** - Integration by parts (7.2)

### Week 4
- **M 09/11/23** - Inverse trig functions (6.8) (hw 4 op.)
- **T 09/12/23** - Hyperbolic functions and their inverses (6.9)
- **W 09/13/23** - Basic integration rules (7.1)
- **F 09/15/23** - Review of chapter 6 (hw 4 cl.)

### Week 5
- **M 09/18/23** - NO CLASS (hw 5 op.)
- **T 09/19/23** - Questions and Answers
- **W 09/20/23** - More Questions and Answers (hw 4 cl.)
- **F 09/22/23** - Exam 1 on Chapter 6

### Week 6
- **M 09/25/23** - Some trigonometric integrals (7.3) (hw 6 op.)
- **T 09/26/23** - Rationalizing substitutions (7.4)
- **W 09/27/23** - Partial fractions (7.5) (hw 5 cl.)
- **F 09/28/23** - Strategies for integration (7.6)

### Week 7
- **M 10/02/23** - Indeterminate forms of type 0/0 (8.1) (hw 7 op.)
- **T 10/03/23** - Other indeterminate forms (8.2)
- **W 10/04/23** - Improper integrals 1 (8.3) (hw 6 cl.)
- **F 10/06/23** - Improper integrals 2 (8.4)

### Week 8
- **M 10/09/23** - NO CLASS
- **T 10/10/23** - NO CLASS
- **W 10/11/23** - NO CLASS
- **F 10/12/23** - NO CLASS

### Week 9
- **M 10/16/23** - Infinite sequences (9.1) (hw 8 op.)
- **T 10/17/23** - Infinite series (9.2)
- **W 10/18/23** - Positive series: integral test (9.3) (hw 7 cl.)
- **F 10/20/23** - Positive series: other tests (9.4)

### Week 10
- **M 10/23/23** - Review of chapters 7 and 8 (hw 9 op.)
- **T 10/24/23** - Questions and Answers
- **W 10/25/23** - More Questions and Answers (hw 8 cl.)
- **F 10/27/23** - Exam 2 on Chapters 7 and 8

### Week 11
- **M 10/30/23** - Alternating series, absolute and conditional convergence (9.5) (hw 10 op.)
- **T 10/31/23** - Power series (9.6)
- **W 11/01/23** - More on power series (9.6) (hw 9 cl.)
- **F 11/03/23** - Operations on power series (9.7)

### Week 12
- **M 11/06/23** - Taylor and MacLaurin series (9.8) (hw 11 op.)
- **T 11/07/23** - Taylor approximation (9.9)
- **W 11/08/23** - More on Taylor Series
- **F 11/10/23** - Yet More on Taylor Series

### Week 13
- **M 11/13/23** - Review of chapter 9 (hw 12 op.)
- **T 11/14/23** - More Review
- **W 11/15/23** - Questions and Answers (hw 11 cl.)
- **F 11/17/23** - Exam 3 on Chapter 9
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## Notes

**Instructors:** This class has two instructors:

**Peter Alfeld:** In these notes, first person pronouns like "I" or "me" refer to Peter Alfeld (since I wrote the bulk of this syllabus). You can usually find me in JWB 127 or JWB 236, and you can email me at pa@math.utah.edu. You may wonder how to address me. It makes me feel young when people of your age address me by my first name, and you are very welcome to do so. However, if you are more comfortable calling me professor or Mr. Alfeld, or just professor, that's fine too. Math professors do many things, but my favorite activity is teaching classes like this one to eager and ambitious students like yourselves! I am thrilled to be here!

**Andy Liu:** LCB 308, aliu@math.utah.edu. Andy is a 5th year PhD student who has taught Math 1220 twice before, so he is very familiar with teaching the material. Do not hesitate to bring up any questions with him during study sessions, through email, or through WeBWorK. He loves working with students who show excitement in the material and are active participants, so ask plenty of questions! We are very excited to work together to teach you all!

**Working together:** I will be responsible for design and running the lectures, writing and grading the exams, determining your grades, and holding weekly office hours. Andy will usually be attending class (so he know what’s going on), he will hold three scheduled weekly study sessions for anybody who is interested, and he will respond to home work questions sent directly through WeBWorK (see below). He will not participate in the determination of your grade (so you can be completely frank when you talk with him). My office hours and Andy’s study sessions will be scheduled after we poll your availability and interest. Both of us will also be available for consultations by email, and in person by appointment.

**Course Information:** Math 1220 is a 4 credit course. It is the second semester of our regular Calculus sequence 1210-1220-2210.

**Prerequisites:** "C" or better in MATH 1210 OR MATH 1250 OR AP Calculus AB score of at least 4 OR AP Calculus BC score of at least 3 Fulfills Quantitative Reasoning (Math & Stat/Logic).

**Course Description:** Logarithmic, and exponential functions, techniques of integration, conic sections, improper integrals, numerical approximation techniques, Taylor Series.

**Time and Place:** Our class will meet MTWF 9:40-10:30am in JFB 103. I expect everybody to come to class, and to know at every stage of the semester what we have so far discussed in class. Andy will hold three weekly study sessions where he will answer questions from everybody who shows up. Those sessions will start during the second week of the semester, and we will determine a suitable schedule during the first week.

**Office Hours:** My formal office hours are after class. However, I am pretty accessible and you are welcome to just drop by my office (JWB 127 or 236) if you want to talk with me. Of course, I might not be there, or busy with somebody else. If you want to be sure I am available, or you need to make a special trip to see me, we can make an appointment.

**Important Dates:** Last day to delete this class (without being charged tuition): Friday, September 1, 2023. Last day to withdraw from this class: Friday, October 20, 2023. (If you withdraw, the class will show
up as "W" on your transcript, it will not contribute to your GPA, and the University will charge you tuition. Withdrawing after the deadline is much more difficult and requires an appeal to the Dean of your major.)

Textbook: The textbook is the same as for Math 1210, Varberg/Purcell, Calculus with differential equations, 9th edition, Prentice Hall, 2007, ISBN-10: 0132306336 or ISBN-13: 978-0132306331. There are various supporting materials, but I don’t recommend that you purchase any of those. We will cover chapters 6-9, and parts of chapter 10. Varberg/Purcell will also be the textbook for Math 2210. Our home page contains specific information on buying or renting a copy of our textbook.

Grading: Grading will be based on the following assignments:

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<td>hw 1–14</td>
<td>3% each</td>
<td>42%</td>
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<td>3 midterm exams</td>
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Fixed Scale: Grading is according to the following scale.

| Grade | 90%  | 85%  | 80%  | 75%  | 70%  | 65%  | 60%  | 55%  | 50%  | 45%  | 40%  | 35%  | 30%  | 25%  | 20%  | 15%  | 10%  | 5%   | 0%   |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| A     | A−   | A+   | B+   | B−   | C+   | C−   | D+   | D−   | E    | else |

The fact that this scale is fixed means that you are not competing with your classmates. You won’t get a worse grade only because somebody else is getting a better grade.

Study Sessions: Andy will hold three weekly study sessions where he will answer questions from anybody who shows up. This is your chance to see a different view, to have things explained in a different way, and to discuss things with Andy and your class mates.

The One Point Contest: I want this course to be perfect. Therefore, if you find a mathematical or factual error on any of the official materials (this syllabus, the home work assignments, the exams and their solutions), and bring it to my attention before I can fix it (by changing the online information or sending out an announcement) I will add one percentage point to your overall score in this class. Depending on the significance of the error I may also notify the whole class and mention your name to them. I appreciate if you bring other errors, like misspellings or grammatical mistakes, to my attention, but there is no point for errors like that. The daily class notes (see the next point) are written and annotated specifically for this class, and do not qualify for the one point contest.

Class Notes: I prepare for class by writing notes before class. These will be published on Canvas and you can look at them before class. They will contain gaps that we will fill in together, during class. I plan to project those notes onto a screen and fill them in by writing on my computer. Later that day I will add the annotated versions of the notes to Canvas as well. The main purpose of making my notes available in this fashion is to enable you to pay full attention to our discussion without being distracted by having to take detailed notes yourself. However, otherwise these notes come without warranties expressed or implied. The notes may contain errors (that hopefully will be recognized and corrected in class), and I may deviate from them during class. In particular, these notes are not eligible for our one point contest.

Home Work: The primary purpose of the home work assignments is to give you a guided opportunity to reinforce your understanding, and to hone and improve your skills. In this class you will receive personalized home work assignments that you do on the web at a time that’s convenient for you. If you give the wrong answer your computer will tell you so, you can figure out what went wrong, and then you can try again. That way you will receive immediate feedback. The underlying software is called WeBWorK. You may already be familiar with WeBWorK, but if not it will be easy to learn. A new home work will open every Monday morning,
one minute past midnight. It will close 10 days later on Wednesdays, 1 minute before midnight. Usually a home work will cover material from the few days before it opens, and the first day or two that it is open. The first home work is largely geared towards familiarizing yourself with WeBWorK and a review of Calculus I, and the last home work will provide a review of the whole semester. You should finish your work on each home work before the next set opens but if you fall behind you have a couple of days to catch up if necessary.

**How to make the most of the home work:** I recommend that you work on the home work problems soon after the set opens. Work the answers out carefully on paper, and then transfer them to WeBWorK. If the answer is a complicated expression you may find it useful to edit the expression in a text editor and then cut and paste it into WeBWorK. There will be many simple one step problems that require you to apply one of the new formulas or techniques we discussed in class. There will also be some more complicated problems that require several steps for their solution, and that make it necessary that you recognize those steps and their sequence. It is useful to work on both kinds of problems with class mates. Talk about the problem, how it fits what we’ve discussed, and how to solve it. Explain to each other what at first you don’t understand. All the problems require for their solution only that you understand the prerequisites for this class (Calc I, Algebra, Trigonometry, some basic facts, and common sense) and what we have discussed so far in the class, but you may have to figure out how to put together these concepts in a way that you had not thought of before. Make sure you understand every step, and every aspect, of the solution. You may be able to get the correct answer in ways that will not help your understanding, for example by guessing an answer, asking someone for the answer, searching online for the answer, or getting the answer via some online facility. Avoid shortcuts that do not help your understanding of the subject and the answer of the specific problem. The main purpose of doing the home work is to build your skills and your mastery of the subject. It’s nice to get the score, and see things turn green on your WeBWorK page, but that’s all secondary!

**Midterm Exams:** Exams will be written, during our regular classroom meetings, as listed. They will be closed books and notes, and no calculators or other electronic devices. You’ll answer the questions on the exam itself and you’ll receive a detailed solution set after each exam. Exams lag our classroom discussion since they take place when the last home work covering them has closed. Exams take place on Fridays. (I’m hoping to be able to get the exams graded over the weekend so I can return them in a timely manner.) Before each exam we will have a review session and one or two question and answer session to prepare for the exam.

**Coordination:** The exam questions will be identical, or almost identical, to home work problems, and examples we have done in class. I may change the numbers involved, or simplify a problem before incorporating it in the exam, but you will greatly benefit from going carefully over our class notes, and making sure you understand the solution of each of the home work problems! (The final exam may contain a few questions written by the Calculus coordinator in consultation with all current Math 1220 instructors, included for assessment purposes.)

**Final Exam:** The final exam will be in our regular classroom on

**Wednesday, December 13, 2023, 8:00-10:00am.**

It will cover the entire semester. Otherwise its format will be like that of the midterms: closed books and notes, and no calculator or other electronic devices. The last week of the semester will be dedicated to reviewing the whole semester, and Andy and I will run a couple of additional review sessions before the exam during final’s week.

**Make ups:** You should make every effort to participate in all exams. If you have to miss an exam for a legitimate reason, then talk to me, preferably before, but no later than one week after the exam. I will add the weight of what you missed to the weight of your final. Thus effectively you will get the same percentage on the missed exam as you will on the final. That’s reasonable since the final is comprehensive. As far as the home works are concerned, since you will have a five day grace period for each homework, there will be no make-ups or deadline extensions for home works. Any make-up or substitute for the final exam will be an oral exam, and will be available only in truly exceptional circumstances. If you miss an exam because you are away on official University business and these procedures do not meet your needs please talk with me. You have nine days for each home work, you can work on the homework anywhere where you have an internet connection, and you...
should be done with each home work long before the deadline. Therefore, makeups or deadline extensions for home work assignments will be available only in exceptional circumstances.

**Subject Matter:** You have taken Math 1210, or an equivalent class, and you know about derivatives and integrals, and the fact that one is the opposite of the other. You have seen how Calculus can be applied to a vast range of problems that would be very hard to solve without Calculus. In this class we will learn more differentiation and integration rules and techniques, and see more applications. We will also study sequences, series, and polar coordinates. (Math 2210, the third semester of our three semester Calculus sequence covers the Calculus of functions of several, dependent or independent, variables.)

**Word Problems:** Calculus was invented (more than 300 years ago) to solve word problems (particularly and specifically in physics). Educational systems everywhere in the world make you and millions of others take mathematics, and Calculus in particular, not because it builds character, but because it enables you in a general and a specific sense to solve problems outside of mathematics. Word problems usually aren’t popular with students because they present an additional layer of difficulty: You have to penetrate the words to get to the mathematics. But learning how to solve word problems is the reason why you are here, and word problems will constitute a substantial part of the home works and exams. Relevant information for specific problems will be given in class or with the problem. The most important ingredient in translating the words into mathematics will be common sense. I am hopeful that you will actually get **excited**, if you aren’t already, about what you can do with the mathematics you will learn in this class.

**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. 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 on a subject you are not yet familiar with, 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 16 hours per week, approximately and on average. Moreover, you should be able to spend that time in good sized chunks without distractions. If you are unable to spend that kind of time during this semester, you are better off taking Calculus 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 anybody can study mathematics successfully. If you follow the suggestions given here in the next few paragraphs you will succeed.

**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 the basic concepts covered in chapters 1 through 6 of our textbook: limits, derivatives, integrals, the Fundamental Theorem of Calculus, the differentiation and integration of polynomials and trigonometric functions, implicit differentiation, the product, quotient and chain rules, and some of the applications of derivatives and integrals. A very brief initial review will be given in class during the first week. If you find that you do not understand these topics then you would be spending your time inefficiently and unproductively in this class, and you should go back and prepare yourself better for taking Calculus. If you have any doubts about your preparation for this class I’d be pleased to talk with you and make suggestions for your course of action.

**Make sure you do not fall behind:** This is the most important suggestion in these pages! If you miss just one key idea now you will not properly understand what we are doing later, and your subsequent time and effort will be wasted. Saving two hours today may result in wasting days and weeks later. In particular, as described above, do the home works right after they open!

**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. A lot of the information in this
class will be given verbally in class! If you have to miss class on occasion make sure you study the notes and the relevant section in the textbook, and ask a friend or myself what happened in class. We will be following the textbook, but only in a general sense, the examples and the emphasis in class will often differ from the textbook.

**Before attending class:** read the relevant section of the textbook. Enabling you to do this is the main reason for giving you the detailed schedule on the first two pages of this handout. Also read through the notes for the specific class. They are available on Canvas. You will receive updates if the schedule changes. Even if you spend as little as ten minutes on this task, and 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.

**During Class:** Have the current class notes available in a form (either printed or on your computer) that let’s you write your own notes on them. Focus on what I am saying, rather than on taking detailed notes yourself. Keep in mind that everything I write on my computer will show up on Canvas later that day, you do not need to copy it. However, you can of course write brief notes of your own. Ours is a huge class, but I welcome questions during class. Feel free to speak up if there is something that does not make sense to you.

**After attending class:** Make sure you understand what we did during class. Go over your notes, do examples, choose and work exercises (see below), think about the big picture, question assertions made in class or in the textbook, try different arguments to get the same result, check things for plausibility and consistency. A very effective technique consists of writing down a detailed summary of the work in your own words.

**Team Work:** In my experience, the most effective ways to be successful in any math class is to meet with fellow students in the same class on a regular basis to study together, and to work on the home work together. Don’t be shy to ask! Everybody in the class is in the same boat and has the same objectives as you. I can help facilitate your meeting other students in the class. It’s OK 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. Another benefit of forming a study group is that you will meet new people and learn new ways of looking at things, which is one of the most enjoyable and valuable parts of your experience as a student here.

**More Help:** We offer a free tutoring service (see the next item) and there are three optional study sessions each week. Also don’t hesitate to contact Andy or myself by e-mail or in person. We’ll be pleased to talk with you.

The **T Benny Rushing Mathematics Student Center** is located on the President’s Circle between the Widtsoe and Cowles buildings (JWB and LCB). It offers very pleasant study space (right next to our library), free tutoring, and a computer lab. My office is just down the hall from the center. For information on facilities and hours of the center call our director of student services, Lisa Penfold, at 801-585-9478, send her an e-mail at penfold@math.utah.edu, or check out

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http://www.math.utah.edu/ugrad/mathcenter.html
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**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 you understand to solve new problems, inside and outside of mathematics. 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 this class you will of course do many exercises in the context of WeBWorK, but you have to go beyond that. Which and how many additional exercises you should do depends on your background, your current understanding, and your interests. Rather than giving you a list of exercises I believe you are better served by your picking the exercises yourself and me giving you just some general guidelines. The best way to find good exercises is to make them up yourself, but
there are also a great many (more than 6,500) exercises in the book, 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! Ask yourself "what if . . ." and see where it takes you. Follow these guide-lines:

• It’s more useful to do a few involved exercises carefully and thoroughly than rushing through a large number of
routine problems.

• Particularly useful are the "Concept Reviews" in the book where you are asked to respond with true or false.
These aren’t really “problems”, rather they are statements designed to check and improve your understanding.
In every section that we cover you should go through these and if it isn’t obvious to you whether a statement is
true or false then go back to your notes and the text and figure out the correct answer (and why it’s correct).

• Regarding the other exercises you should be able to do any of them unless they call for some mathematics that
we didn’t cover, or there are some arcane details of a word problem that you are unfamiliar with.

• However, this does not mean you should do all of those problems. Instead, look over the problems. If it’s
obvious how to do a particular problem, and it’s not otherwise interesting to you, skip it. If you are not sure,
start the problem, and either finish it, or once it becomes clear what’s happening, drop it. If you have no idea
how to do a problem, and your difficulties are related to the math we are doing, then go back over your notes,
talk with people, figure out what you are missing, and then return to the problem.

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. We’ll see many applications of this idea in the course of the semester.

Always Check your Answers: Everybody makes mistakes, and you simply have to recognize this
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. 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,
checking integration by differentiation, 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 it 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, if perhaps least likely, 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 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 your textbook 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.

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
exam, just make sure the mathematics covered by the exam make sense to you, following the suggestions above.

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1. If you are not sure of an answer to an even numbered problem, or one you made up, talk to me.
2. This is not the testing we inflict upon our students!
If you understand the math you’ll be able to handle anything that might appear on the exam. Here are some more suggestions specifically with respect to exams:

- **Cramming does not work.** That is particularly true in mathematics. Instead work steadily throughout the semester, and **relax** and do something fun the day or the night before the exam.
- Make sure you arrive for the exam well rested and with time to spare.
- 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 it may also 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 it blank. Write what you do understand, and when you are done with the easier problems spend all the time you have available trying to figure out those problems that appear hopeless.
- After the exam go over the answers (which you will receive as you walk out the door). 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 the phrase "understanding mathematics", and pick the first item (after the sponsored items) that you will see. This will resolve all your math issues.

**Great Math Book:** The book by Courant and Robbins: "What is Mathematics" (566 pages, 2nd edition, August 1996, Oxford Univ Press, ISBN: 0195105192) was first published in the 1940s. The book has been phenomenally successful and is still in print. It has turned untold numbers of youngsters to mathematics (including myself some time ago). It’s available as an inexpensive and highly recommended paperback.

**Language:** A necessary part of understanding mathematics is mastering the relevant language. Don’t skip over words you don’t understand fully. Instead, pause to make sure you know what they mean. I recommend that you keep an ordinary dictionary handy during your studies. You may also want to purchase a mathematical dictionary like the excellent and inexpensive Harper Collins Dictionary of Mathematics, ISBN 0064610195.

**\TeX:** During this semester you will receive a number of handouts (like this syllabus, exams, answer sets) containing typeset mathematics. I’m using the \TeX typesetting system which is a true work of genius. You can use it yourself easily, and you may enjoy learning about it. There are two versions of \TeX, the original, now called plain \TeX, and a newer version called \LaTeX. I have a bias towards plain \TeX, but you are probably better off learning \LaTeX. It is now used much more widely than plain \TeX. To get going borrow or purchase the book ”\LaTeX: A Document Preparation System”, 2nd ed., by Leslie Lamport, the author of \LaTeX. The \TeX and \LaTeX software is free, you can use it on most University systems, and you can download it to your PC or Mac.

**The Keynote Speech** for this class is given by Sir Isaac Newton who lived 1643-1727 and was one of two independent inventors of Calculus. You want to learn how to reason nimbly and judiciously, rather than turn into a vulgar mechanick:

---3--- The genius is Computer Science Professor Don Knuth of Stanford University. Calling \TeX a work of genius is controversial, I have also seen it called a “hideous hack”. I believe in my opinion, but you will have to form your own.

---4--- The other was Gottfried Leibniz, 1646-1716. Newton invented Calculus first, but Leibniz published his work first. The two of them were bitter enemies who fought viciously about who should get credit. Despite being
A Vulgar Mechanick can practice what he has been taught or seen done, but if he is in an error he knows not how to find it out and correct it, and if you put him out of his road, he is at a stand; Whereas he that is able to reason nimbly and judiciously about figure, force and motion, is never at rest till he gets over every rub.

Isaac Newton to Nathaniel Hawes, 25 May 1694
(That’s how they talked and wrote in the 17th century. Obviously, the vulgar mechanic or he that is able to reason nimbly or judiciously may be a woman or a girl.)

**Basic Principle:** I used to write long explanations of the dire consequences of waiting too long to begin work on a project, but after many years I managed to condense those treatises into three words. Believe me:

**Procrastination is Hazardous!**

You are going to learn some powerful stuff, and hopefully you’ll even have some fun in this class, but get going right away and make sure you stay on top of things!

perhaps the greatest mathematician in history, Newton in particular was not an easy man to get along with. In his later years he served as the director of the English Mint, and in that capacity proved one William Chaloner guilty of high treason for counterfeiting, and got him executed.
Additional Information

Student Data: The instructors in our department have access to the following information about the students registered in their classes: Name, preferred name (if entered in your CIS account), your student ID number, your major, your status as freshman, sophomore, junior, or senior, and your photograph (to help us learn your names) on your University ID card. Apart from your scores in our class, we do not have access to other parts of your University Record.

Wellness Statement: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a students ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at www.wellness.utah.edu or 801-581-7776. (Note: While I have no special expertise in these matters please don’t hesitate to talk with me privately about your personal circumstances if you believe this may be useful.)

The Americans with Disabilities Act: 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 & Access, 162 Olpin Union Building, 801-581-5020, https://disability.utah.edu/. CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted on the basis of your sex, office for equal opportunity and affirmative action including sexual orientation or gender identity/expression, you are encouraged to report it to the University’s Title IX Coordinator; Director, Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, https://oee.utah.edu/contact-us/index.php or to the Office of the Dean of Students, 270 Union Building, 801-581-7066, https://deanofstudents.utah.edu/. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to police, contact the Department of Public Safety, 801-585-2677(COPS), https://police.utah.edu/.

Campus Safety: The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu

University Counseling Center: The UCC staff is committed to supporting the mental health needs of our campus community. Their phone number is 801-581-6826. Their hours are Monday-Friday, 8:00am-5:00pm. For after-hours emergencies, contact the 24/7 Crisis Line: 801-587-3000. More information is at https://counselingcenter.utah.edu/.

Office of the Dean of Students: The Office of the Dean of Students is dedicated to being a resource to students through support, advocacy, involvement, and accountability. It serves as a support for students facing challenges to their success as students, and assists with the interpretation of University policy and regulations. To contact the Office of the Dean of Students, please email deanofstudents@utah.edu or call 801-581-7066. There is more information at https://deanofstudents.utah.edu/.