Writing clear and convincing proofs is one of the major types of mathematical writing, and hence it is very important that we provide you with plenty of opportunities to learn it. Some of you are probably already comfortable writing proofs; others may not have had many chances to practice this type of writing yet in your mathematical careers. Never fear, you'll all have plenty of practice in this course! This process will aid your mathematical development and can, I've found, significantly improve your clarity of thought outside of math as well. Because so much of the point of this class is that you learn to write proofs well, I of course have to set high standards for your homework. However, while I want your finished problem sets to reflect good proof-writing techniques, I also know that this takes practice. The way I handle this dilemma is to allow you one rewrite of any problems you made a real effort on the first time.

How I Grade The Problem Sets:

Most of the homework problems will be worth 5 points. The possible scores on your first try will be 5, 4, 0, or No Grade.

- A 5 represents a clear and concise proof with no mathematical errors.
- Generally a 4 will represent a solution that has no mathematical errors but which is not as clear as it could be–something which is not as good as it could be, but which is acceptable. You can keep a 4, or choose to rewrite it.
- A genuine attempt at finding a solution but which has serious omissions or errors, **or** which is extremely unclear will receive a No Grade. This reflects that in order for you to "get" the problem, you need to put more thought into it, and should rewrite it.
- I will only give 0s for those problems which I do not feel you made a serious attempt to solve. While I certainly encourage you to do these problems, for your own benefit, they can not be rewritten.

I plan to drop the lowest **non-zero** problem set score at the end of the semester. If it is warranted, I may agree to drop a problem set that received a 0 as its total score instead, but only if the reason you received a 0 was unavoidable.

Put Real Effort Into The Original Draft

You should put genuine effort into the homework the first time around. It can be tempting, I know, to blow off the homework during a busy week, figuring you can always redo it the second time around. When students do that, however, they are cheating themselves in many ways: firstly, it often takes many efforts to really understand a problem, complete with real feedback from me–if your first attempt was not backed by real effort, then the feedback you get from me won't be as useful as it could have been; secondly, if you blow off the original homework, there's a delay in your learning the material –thus making the next material significantly harder to get; and finally, it turns into a vicious circle– if you're spending this

week working on last week's homework that you blew off the first time around, then of course you're blowing off this week's homework and will have to rewrite most of those problems ...

To remove some of this temptation, I have built into the system ways to discourage you– it is for this reason that you can not rewrite a problem that receives a 0, and also partially for this reason that the highest score I will give a rewritten problem will be a 4.5.

When Problem Sets Are Due

Problem sets are due Wednesdays at 4pm. Rewrites are due, along with your original paper, within **one week of when I return the homework to the class**. For example, if I return the homework on Monday, you must turn in your rewrite by classtime the next Monday.

Be aware that

Late Homework is Not Accepted!

I will only make exceptions in well-documented cases of dire need. Because you can not rewrite problems on which you receive a 0, it is very important that you do not neglect to turn in any problem sets.

Guidelines For Working With Others

An important aspect of your mathematical development is that you learn to discuss mathematics with others and to collaborate on problems. I think it's a really good idea to get in the habit of regularly meeting with others in the class to discuss the problems – although I suggest you give serious thought to the problems before meeting, and I **require** that you actually write the problems up once you have left the group. To further encourage group work, the homework assignments will alternate between Individual assignments and Group assignments.

On the group homework assignments, you **must** work in a group of two (three is only acceptable if there's an odd number of people in the class) and turn in one paper. It is extremely important that both of you understand every solution that your group produces. If one of you has a brainstorm and figures out a tricky problem, the one who had the brainstorm should take the time to make sure the other partner understands it, and the one who did not have the brainstorm should be sure to ask whenever there's a leap of logic they don't follow. On each assignment, one student will be designated as the primary author who writes the solutions, and the role of primary author must alternate between the members of the group. **Make a note on your homework of who the primary author was.**

For the Individual assignments, as I mentioned I still encourage you to work with other students, but each person must write up the proofs on their own, and turn in a separate paper.

Guidelines For Homework Presentation
Everything in your paper should be precise, comprehensible, completely justified, and written in complete sentences. I (or anyone else in the class) should be able to read it and completely understand how each step followed from the one before (or when a new train of thought is starting) without having to think very much at all.

Here are a few guidelines for the presentation of your homework. If you do not follow these, I **will** return your homework to you ungraded!

- Your writing must be clear and legible.
- Do not turn in your first draft. You should revise, polish and rewrite your solutions.
- Be sure to put separate ideas into separate paragraphs, leave space between paragraphs, and space between problems. All of this space serves two purposes: firstly, it gives me plenty of room to write comments, but also, it calms the reader (I, at least, get tense and annoyed when a lot of information is crammed into a small space).
- If you write in pen, only write on one side of the page, and there should be no scratch-outs.
- Do not turn in paper torn from a spiral notebook with ragged edges. Separate sheets should be stapled together (not paper clipped, or corner-folded).

HOW TO MAKE THE BEST USE OF SOLUTIONS IN THE BOOK:
The odd-numbered problems in the book have solutions in the back. I have not looked at them closely enough, yet, to know whether they have not only the sequence of thought that leads inexorably to the conclusion, but also the comments that make such a sequence easy to follow. In either case, however, you should be careful to **use these wisely!** On the one hand, having access to plenty of proofs or proof outlines can help you to see the way we present a series of connected ideas to form a convincing proof. On the other hand, you will not learn to write a proof from scratch if you peek at the solution after even half an hour of thought – the whole idea behind writing a proof is trying many different approaches until you find just the right one. My suggestion, therefore, is that those of you who feel uncomfortable writing proofs may want to look at the solutions to several **un**assigned problems to get a feel for how the outlines of a proof should look, and for phrases that are commonly used. Of course, a proof that has been copied out of the back of the book will receive a 0.