On Writing Up
or
What Sort of Wacky Homework Grade Is *That*?

I will be giving you a problem set every week this semester. This handout is an attempt to explain what is expected of you and how those assignments will ge graded.

First of all, there will be several assigned problems. You are expected to work on all of them, writing down their solutions to your satisfaction. At this stage, it is a good idea to work with others, so that the cogency of your arguments can be assessed by another person. (It's also much more fun to attack these with others than to struggle alone.)

Second, I will ask you to "write up" and turn in the problems. Most of this handout is an attempt to explain what "write up" means.

It'll then be time to grade. Each homework assignment will receive a numerical grade between 0 and 10. This is how that grade will be built up:

- I will pick four problems to be graded, one deliberately and three at random.
- Each problem will get a score of between 0 and 2. This will be a score for the overall correctness of the mathematics.
- The grader will then add either 0, 1, or 2 "style points." These will reflect the quality of your writing. (More details below.)

How do you intepret the resulting number? Roughly as follows: take your score, divide it by 2.2, and apply the usual "grade point average" scale. So an 8 corresponds to a grade somewhere between a B and a B+. Let me emphasize that *this is only a rough idea* of the value of a homework grade; the actual method I will use will depend also on the median homework scores. That way I can compensate if our grader turns out to be too stingy with points.

When averaging your homework scores *I will discard your lowest score for the semester*.

Now for the real meat of this handout: what is "writing up"?

I expect your solution to a problem to be a clear and readable short essay. The mathematics should be correct and should include enough explanation so that what is going on is clear to the reader. It should be written in full (mathematical) sentences, using both words and symbols. It should make sense. You are attempting not simply to demonstrate that you can do the problem, but that you *understand* what you are doing.

Here are a few specific tips:

- Never ever turn in first draft material.

- Reading your mind is not part of the grader's job description. What is on the paper will be graded. "Oh, but I meant. . . " will not help.
- Your writing should include an *appropriate* level of justification. That is, you should explain why your method or argument works in a way that makes sense for someone at your level of mathematical sophistication. You probably don't need to have addition explained to you, so you don't need to explain it when you are doing your write-up. On the other hand, if you are using a theorem you learned yesterday, you probably should mention that you are using it. It is *your* job to know (or learn) what the appropriate level of justification is.
- When you are asked to prove something, don't try to fake it. If you know an argument is incomplete and then write it up as if it were a complete argument, your are hiding an important fact from the grader, namely, that you know the difference between a correct argument and an incorrect one. If you simply can't find a correct argument, then sketch out the argument you have and *indicate that you know that something is missing, and where*. This isn't as good as giving a correct argument, but it's better than standing the nothings up so that they look like somethings.
- Most of you hate it when your professors say something is "obvious" or "clear" or "trivial." In general, you should avoid using those words. If something really is obvious, then you can probably just say it and not give any further argument. If an argument is needed, then it's not obvious.
- You don't need to be stuffy, but you should be clear and precise, especially in the trickier parts.
- If you don't understand it well, you won't be able to write it well. In fact, as you write you will almost certainly discover that there were parts of your original solution that you didn't quite understand. If that happens, you will need to go back and think about it some more. This means that *writing up your solution should not be a last-minute activity.*
- Apply the golden rule to your writing: write the sort of mathematical text that you would enjoy reading.

Writing mathematics is hard. But telling others about your mathematical work is almost certain to be an important part of what you end up doing with your mathematical education, so it's crucial to learn to do it.

What you see here is the final product. However, you should be aware that there was a huge pile of wadded up paper tossed in the corner that contained the work leading up to what you see.

– Charles Biles, on mathematics textbooks