

## CHAPTER 1

### How to format homework

Beyond the content, namely solving problems and writing them up clearly, with correct style (as in “How to write math”), there is the matter of *formatting* homework: taking your answers and putting them in a form that’s *easy for the grader*.

This is tedious, and these are minor points, but a moderately sized class easily goes through over 300 individual assignments, say of 1,500 to 2,000 pages total, per quarter or semester: it’s a lot of paper, and people *do* mess this up.

The key steps are:

- **Identify** your assignment
- **Assemble** your problems

#### 1. Identify

Identify your homework by putting the following identifying information in the top right corner (opposite the staple):

Your name

Problem set

Teacher / class (and section, if relevant)

EG:

C. F. Gauss

HW #1

L. Euler, Math 101, Section 17

Why? Obviously you must include your name. The problem set number helps keep which assignment it is straight (without having to look at the problems to figure out which assignment it is); this is particularly important if the grader collects several problem sets at once (say, there are 3 problem sets per week and the grader grades over the weekend), or for late assignments.

The teacher and class is subtler: it’s in case the assignment gets *lost* or misplaced. If someone finds a problem set without the teacher’s or class’s name, they can try to track you down or ask their colleagues:

“Does anyone have a student named C. F. Gauss in their class?”

while if the teacher's name is on it, you can usually easily track down the teacher.

## 2. Assembly

Your problem set should be easy to handle and mark up by your grader.

Graders generally grade one problem at a time, across all homeworks (sometimes they read one problem set at a time, but that's less ideal: less consistent). Thus they have a pile of homeworks, which they go through for each problem, flipping pages as necessary.

They read the problem, assign a grade (which they write in), and perhaps mark up the problem (make errors, write some notes).

Thus, make your homework:

- easy to handle
- easy to read
- easy to markup

Ideally, hand in:

- stapled
- longhand (I prefer italic in black ink)
- in order
- 1 problem per page, single-sided
- with space to mark up

**2.1. Staple.** Staple your homework with a single (standard size, metal) staple in the upper left corner: the point is simply to keep the problem set together.

This is not at all hard, but some students submit ridiculous homework. I had numerous problems with this over the years, and fixed them by refusing to accept unstapled or improperly stapled homework.

An inexpensive pocket stapler (with the included 500 staples) will last an entire undergraduate career, and departments generally have staplers.

Some students like to use colored staples, to identify their homework in a pile (this is fine).

Unacceptable fasteners include (I have received these all)

- no fastener
- a "paper" staple: the corner folded over (perhaps repeatedly) and torn. These aren't very sturdy (unlike proper staple-less staples; v.i.).
- a paper clip (these fall off, especially when flipping pages)

- a massive “100 sheet” staple, which sticks out of the paper menacingly
- a single lengthwise fold (!)

Staple-less staplers (that use the paper itself) are fine, and if you have a kirigami/origami expert in class, it’s ok if they occasionally exhibit their skills, but frequently dealing with exotic homework is just a pain.

**2.2. Leave space.** Leave space at the *top* of your assignment for a grade, and *around* your problems so that individual problems can be marked and so that there’s space for comments. (This also gives you space to make corrections!)

It’s fine to leave big space between paragraphs, space enough for several lines of remarks.

Do not write block text without space, as there’s nowhere for the grader to write!

Do not save space by having double columns: leave the other column area for comments.

Ideally, use a single page per problem (this is suited for longer problems in more advanced classes), or at least don’t put too many problems on one page.

This (not leaving enough space) is largely an issue because early math work is just a sequence of computations which can easily be done in ones head, so students get used to just writing down the answer (which is the bottom line), and omitting the tedious intermediate steps (which aren’t read anyway). In proofs, of course, the steps, the argument is the point, and must be written.

**2.3. Legibility.** Beyond obviously not writing cramped, faint text, I suggest:

**Black pen:** I like dark black (gel) pen. Pencil is ok, but often faint; similarly blue pen is ok. Spot color can be useful (particularly in diagrams), but don’t write block text in some other color, and don’t use the same color as your grader (usually red)!

**Single-side:** Double-siding is laudible and ok, but reduces legibility (because it shows through to the other side), and makes page-flipping a bit trickier.

**Italic:** Italic handwriting (specifically, Getty-Dubay italic, as taught in the book “Write Now”) is superior to the Palmer hand (either the looping cursive or the ball-and-stick printing) you may have been taught: it is both more legible and

faster to write. Further, you likely write in some form of it already, as it is more natural.

For the paper, thick is preferred, and ruling helps. (Graph paper doesn't, unless you are plotting functions, and the grid makes reading harder.) Some students like to use different colored paper, say to make it easier to find their homework in the stack. (I used pale green legal paper in grad school.)

**2.4. Corrections.** Firstly, you should do scratch work, then write up your homework: don't start writing what you'll hand in before solving the problem! (Otherwise, this leads to horribly messy homework.)

For those mistakes that do occur, I prefer them to be clearly crossed out (as I like pen), though erasing (pencil) is ok – but don't rewrite and re-erase repeatedly: move to fresh paper! White-out is also ok, but I find it unnecessary and that it makes what's written over harder to read: just cross it out.

**2.5. Submitting homework.** If for some reason you cannot hand in homework personally, best is to put it in the teacher's or grader's box or give it to a friend to hand in.

More exotically, if for some reason you are off-campus (or late and the grader is gone), and must submit homework, you can fax it (to a department fax) or scan it and email it, but this is really obnoxious and extreme.

Don't write it by computer (v.i.).

**2.6. Homework by computer.** Don't.

Writing math homeworks by computer is a waste of time: it's an amusing perfectionist streak, but slows you down and is often less legible and harder to mark up.

Math typesetting is *hard* and *slow*. Recall that the  $\text{\TeX}$  code for starting and ending math mode is  $\$$ : Knuth's pun on the traditional expense of math typesetting.

Even if you type fast, it doesn't save you time: if you've done scratch work, you won't have much edition to do (these are individual problems, not long essays), and  $\text{\TeX}$ 'ing is less immediate than writing longhand.

Lastly, don't use Microsoft Word. It produces hideous looking math.

**2.7. Ending proofs.** I prefer ending proofs with the text “, as desired” (following the last statement, which was what we wished to show), followed by a filled square (a “Halmos box” or “tombstone”).

A common ending is “QED” (quod erat demonstratum; which was to be shown/demonstrated), likely following Issac Barrow; one can also write QEF (quod erat faciendum; which was to be done), which is somewhat more appropriate for homework. If you prefer Greek, you can write  $\square$ , d’apres Euclid.

Other notation for a Halmos box make it a square or rectangle, sometimes empty, sometimes filled in (shaded or with an X).

I’ve friends who draw a little icon at the end of proofs (like a little dog head); to each their own.

### 3. For graders

Red pens are traditional for markup (and I prefer them): they’re clear, but a bit loud and stress-inducing. Consider instead green pens, which are also distinctive but more calming.

For handling homework, a folio (or simply folder) helps keep them together.

For privacy, it’s best to put the overall homework grade on the *last* page (at the bottom), not on the first page, as these are visible when handed back in a pile.

If some people work together, you should grade their homework together: this encourages consistency in your grading (they often will compare notes and grades, and complain (correctly) if they wrote the same thing and got different grades), and lets you see if people are copying exactly or writing up separately.

### 4. For teachers

#### Specify notation

If possible, specify notation in the problem statement; thus all students will use the same notation (and it’ll be easier to read). You can’t and shouldn’t specify notation for objects / concepts that students should come up with, but do notate everything mentioned in the problem statement!

#### Number problem sets

Give each problem set a number; don’t just list problems. This helps keep problem sets straight.

#### In order

Simple enough, but when assigning problems from the book, specify them in order.

Also, categorize:

Chapter 5, problems 1, 2, 5

Chapter 6, problems 2, 3

...is a lot clearer than:

5.1, 5.2, 5.3; 6.2, 6.3