

Proof Format and Techniques

There are two main ways to write proofs: in mathematical shorthand or in complete sentences with limited symbols. How many math symbols you should use in a proof depends on the situation. In our class or if you ever submit a paper to a journal, you should use as few symbols as possible (for our class limit yourself to the list of acceptable symbols listed in the syllabus) and write in complete, grammatically correct sentences. If you are proving something for yourself or are in a class where the instructor does not care how many symbols you use, you can use as many symbols as you want. In either case, your job, when writing a proof, is to clearly communicate your solution to a reader who does not know whether the statement is true or not. You are trying to convince the reader that the statement is true.

There will be chances to revise your homework. For revisions, you must turn in both the original version and the revised version. If you do turn in a revised version, your final score for that homework set will be the average of your original and your revised version. If you do not turn in a revised version, your score from the original version will be what you get on that homework set.

Both the original homework set and the revised homework must be turned in on time, which will mean by midnight Tuesday. I will accept either handwritten or typed homework. If you handwrite your proofs, they **must be legible**. If you type your proofs (in latex, word, etc.), the formatting must be correct. Be aware, computer programs often have trouble with math notation if you do not know what you are doing. If you scan your homework and email it to me, it must be in PDF format. Also, make sure you can read the scanned document before sending it. Make sure your name is either on the scanned document or is in the name of the file. In all cases, if I cannot read what you submit, you cannot get a good grade.

In most cases, grades on revised work should be better than on the original. However, that may not be true if you have comments on your original work to change something and you do not make any changes. In that case, your score could decrease.

If you write homework questions (or test questions) on your own paper and not on the provided sheets, you must write out the full questions as given, including any directions. Write the question in ink so that it is distinctive from your solution. If you type the homework set, bold the question to distinguish it from your solution.

Here is an example of two ways to prove a statement. Both are good proofs, but only the second way will be acceptable in our course.

Statement: Let a, b, c , and d be integers. If a divides c and b divides d , then ab divides cd .

Proof (way 1: using symbols):

Let $a, b, c, d \in \mathbb{Z}$ and assume $a|c$ and $b|d$.
 $\Rightarrow \exists r, s \in \mathbb{Z} \ni c = ar$ and $d = bs$
 $\Rightarrow cd = (ar)(bs) = arbs = abrs = (ab)(rs)$
 $\therefore ab|cd$

Proof (way 2: using sentences not symbols):

Let a, b, c , and d be integers. Assume that a divides c and b divides d . Then by the definition of divides, there exist integers r and s such that $c = ar$ and $d = bs$. Thus, $cd = (ar)(bs) = arbs = abrs = (ab)(rs)$. Therefore, by the definition of divides, we have that ab divides cd .