

Guidelines for writing homework solutions.

Write clearly, with reasonable sized handwriting, so it's easy for me to read.
Explain pretty much everything. If you're unsure whether to include something, include it.
I'll let you know if you're including more than you need.
Whenever you use the hypotheses of a problem, state that & how you're using them.
Whenever you use a theorem, state that & how you're using it. State the name/number of the theorem you're using, if it has one.
Sometimes you might have a picture in mind that gives an intuition about the proof, and sketching such a picture can be helpful to help me know more quickly what you're saying. It might help you in thinking about it too.
However, you also need a formal proof written up. A sketch is generally just optional, so don't worry about it if you'd rather not include one.

Suggestions for working on homework problems (and a bit on studying).

When you start on a problem, first make sure you know exactly what all the definitions are that are relevant to the problem.

After thinking about the problem, if you're stuck:

- Try thinking about specific examples, or maybe adopting extra hypotheses to simplify things first. (E.g., if the problem says something like "every open set has property X", you could try thinking about just some particular, simple open set first, and try to prove property X holds of that particular set.) If you can solve the problem in that easier/more specific context, some or all of the ideas might be relevant to the original problem - try to generalize the ideas to work for the original problem. If you still don't have a complete solution, try another example, or adding hypotheses again, but less than the first time. And so on.
- Look at similar or related theorems, examples, etc that we've done in class or that you've seen in the book. Think about them again. Try to adapt methods used there to the present situation.
- If you are asked to find an example of something, it's often useful to think about what things *must* be true about any such example, to guide you to find one. I.e., if a problem says "Give an example of a topological space with properties X, Y and Z", and if it's not obvious what such an example might be, first try to work out what has to be true about any topological space with properties X, Y and Z. This might narrow down the possible choices of an example significantly, and make a possible example easier to come up with (or even maybe indicate what the example would have to be).
- You should attempt all the problems on your own before talking to others about them. This is important in developing your understanding.
- After you've put in a good effort, if you're stuck, talk to me about the problem. I can help you move in the right direction. Also talking with other people in the class is often useful. If you talk to someone who already knows a complete solution, just get a hint from them.
- Struggling with a problem is often helpful in terms of your development of understanding. It makes you examine the details, and think about the various concepts carefully. If you're reading a theorem, it's sometimes useful to try to

prove it for yourself before reading the proof in the book. Often this is very difficult. Sometimes you might work out some of the ideas, and sometimes you might find a complete proof. Sometimes doing this leads you to see other things in the periphery of the theorem, which you might not have noticed if you had just directly read the proof in the book.