

## Prof Z's Guide to Doing Homework Effectively

1. Take the printout of the homework problems and some scratch paper to a table (with no computer) at the library. Turn off your phone (preferably completely, at least turn off wifi and data).
2. Work on each problem in turn (although not necessarily in order; avoid skipping around between problems, however, as it will undermine your ability to think deeply about a problem). For each problem:
  - (a) Read the problem.
  - (b) Rewrite the problem statement in your own words in the notebook. You might want to reorganize the information in the problem or leave some of it out. For example, if the problem says "Let  $n$  be a nonnegative integer, and let  $p$  be a prime. Prove that if  $p$  divides  $n$  then  $p$  divides  $2n$ " you might want to write in your notebook "Know:  $p|n$ . Want:  $p|2n$ " because we generally have  $n$  be nonnegative and  $p$  a prime, and you don't need to use ink on that. The more ink is on the page the more there is to distract you from what the problem is actually about.
  - (c) If there are any words in the problem statement that you either (a) don't know the definition to, or (b) are still not used to working with, write out their definitions, in your own words.
  - (d) Try to work from what you know to what you don't know. Sometimes you won't be able to do this in one step; however, if you can write down something you can conclude from what you know, that's often a good step in the right direction. One very useful question to ask yourself is "what information that is in the problem have I not used yet?"
  - (e) If you get stuck for more than ten minutes (where "stuck" means "not making any motion on the problem at all", not "not solving the problem completely") try another problem. Before you leave the problem, however, write down questions for yourself: either words that you need to look up, theorems that you vaguely remember that you might want to look up, or information you aren't sure how to use. **Resist the urge to look online or in the textbook for help.**
3. Once you have done this for every problem, you may turn on the internet to answer questions you have written down on your scratch paper, or open the textbook to look through it for help. However, other than writing down answer to questions you thought of earlier, you should not work on the homework with the internet on or the textbook open.
4. Try again from the beginning.

5. If you are still stuck on some problems, talk to other students or go to office hours. Try to prepare some questions ahead of time (just like you did in the homework).

**The goal of homework is to help you understand the material so well that you do not need to study for exams. Exam studying should, in an ideal world, take no more than half an hour: ten minutes to glance through the definitions, ten minutes to glance through the theorems, and ten minutes to glance through examples/non-examples that we have discussed.** Obviously, the real world is not ideal, and many things get in the way of us being able to learn material as thoroughly as we might like. However, if you do the homework carefully as outlined above, it will help greatly. Doing homework in this way will take much longer, originally, than you might be used to, but you will soon see the benefits.

I strongly encourage students to typeset their homework. Typesetting has the following benefits:

- It improves understanding of the problems and theorems used, as it requires the student to look through the problem twice, once when working through it and once when writing it up.
- It makes it easier to study for exams, since the student retains a copy of the homework which is much more difficult to lose.
- It encourages a better writing style, since most people type faster than they handwrite, and since formulas are more difficult to typeset than words.
- It makes it easier for the grader, since it is easier to read than handwriting is.