TEST TAKING ADVICE

The following is based on how I prepared for (mathematical) exams during my undergrad years, and my strategies during exams. I don’t know how much of it is relevant to American-style tests, because, in Cambridge:

- we had two months without classes to prepare for our exams (I’ve tried to scale my plan down for you)
- our exams were at 9am or 1pm; I’ve never taken an exam in the evening
- our exams were 3 hours long, and the questions were long with many parts. Tackling GREs or a 50-minute midterm would require very different strategies.
- we had a lot of choice in which questions to answer, so I’m probably emphasising good question choice more than necessary.

Also, what constitutes effective test preparation seems to vary widely from person to person, so not all these techniques would apply to you. You should try out many people’s advice (ideally during high school, when things don’t matter as much) and decide on a plan that works for you. This is perhaps my most important advice, because having a plan reduces stress. But be flexible with your plan, because, as you learn harder material, you may need new ways to cope with it (for example, I always revised alone in undergrad, but for my qualifying exams in grad school, I found it very useful to work with friends).

I welcome suggestions, please send them to amypang@stanford.edu.

Before the test.

- make a timetable of when you’re going to do the activities below. This will ensure you have enough time to do everything you want to do.
- read through your notes and make a list of important theorems, properties, and problem solving strategies. I don’t usually include definitions because I tend to memorise them quite easily. I like to do this electronically because then I can add and rearrange things, and the end result is more organised. Don’t worry about typesetting the maths properly, as long as you understand it, it’s fine. I don’t even write in full sentences.
- only if you have plenty of time: read your notes, write down which topic you read on which day, and try to write out every important fact from
that topic 3 days later. If you got any of these wrong, try again after 3 more days.

- do practice exams. I usually do them in timed conditions, to prevent procrastination. If you don’t have many 3 hour blocks (or however long your exam is), you can do your first few tries in two blocks of 1.5 hours. After the allotted time is up, try to finish it with your notes (in a different coloured pen) before looking at any published solutions. (Remember to leave time for this part, don’t schedule your timed practices too close to each other!) This is more effective than reading your notes because solving problems force you to actively think about the material. As you do more papers, you’ll become more fluent in areas which gets asked often, and you’ll develop some test-taking strategies for this particular style of exam. You’ll begin to recognise the sorts of questions that you can do easily, and those that are harder. Score your timed effort: this can be confidence boosting as you’ll see your score increase as you prepare more (we’ll come to the other reason later).

- a day or two before the exam, do a mock exam, preferably in an unfamiliar environment like the library or just a different table in your room. Try a test from two or three years ago (recent enough to be relevant, but they rarely test the same thing two years in a row) and practise the strategies of test taking (see below). Don’t leave this till the night before or the morning of the test; if you then find a question that you can’t do even with your notes, you’ll panic and it’ll be hard to find someone to help you at that short notice.

24 hours before the test.

- get lots of sleep and food. If it’s a morning exam, consider going out to a cafe and getting a hot breakfast (you deserve a treat after all that work). If the test ends during or a little after your usual mealtime, have a snack before the test to make sure you won’t be hungry.

- stop learning anything new. I find cramming incredibly stressful, and you’re better off making sure you’re healthy, energised and relaxed.

- read through the homework questions, previous midterms and practice exams that you’ve done, to remind yourself of useful problem-solving strategies.
• have some fun away from classmates who are frantically cramming (they’ll only stress you out). Find someone who shares the anti-last-minute-studying philosophy and watch TV or play video games together, something that will take your mind off the test.

• right before the test, read your sheet of important theorems.

During the test. (remember, we’re assuming this is a test with long, involved questions, not an MCQ where speed is everything)

• don’t write any solutions in the first 10 minutes of a 3-hour test (you can work out the analogous proportion for shorter tests). It can be tempting to dive into a write-up the second you see something familiar; to avoid this, I hold a pencil during this time (we had to take exams in pen).

• Instead, read through all the questions (so there’s no nasty surprises later on) and think a little about how to solve them, to judge their difficulty. Then make a rough choice of which questions to attempt and in what order, according to your average score on practice exams. For example, if I usually do 8 questions out of 10, then I’ll pick maybe 6 questions that I’ll definitely do, leave out a question that looks impossible, and decide later which two of the remaining three I’ll attempt.

• Start with a question that you’re 90% sure you can do, to get some confidence going. If possible, don’t choose the easiest question.

• Next, try a couple of harder problems, while your mind is still fresh. If you get stuck or feel frustrated, move on to another question - this is still the beginning of the exam, so you have lots of time to come back to it.

• When your brain starts to feel tired, do some easy questions.

• If you’re allowed to go to the bathroom unaccompanied, do so towards the middle of the test. Sometimes you get new ideas in the process. Some people like to pace outside the test room if they are stuck.

• How to actually attempt a (hard, non-computational) question:
  – On rough paper, translate the information given in the question into equations (eg write out definitions). Rearrange and combine these in ways that you think might be useful. Do the same with the conclusion you want to reach, trying to make the argument meet in the middle. Write down every idea you have - you’re making it twice as hard if you keep everything in your head.
TEST TAKING ADVICE

- If this isn’t getting anywhere, try substituting some easy numbers into the unknowns (eg work in $\mathbb{R}^2$ instead of $\mathbb{R}^n$). You won’t get credit for working out a specific case when you’re asked for a general proof, but sometimes it can help you see how to prove things.

- Once you have a plausible argument, quickly read it from beginning to end to make sure it works. It’s important to check you didn’t do anything dodgy when you were working backwards.

- Identify the main steps in your argument. This will help you structure your write-up.

- Explain what your first step is (eg “We solve $\det(A-xI)$ to find eigenvalues”), and then do it; explain your second step and do that, and so on. Leave plenty of space at the side and between steps, in case you later need to fix something.

- When you’ve finished, take a minute to reread your work and see if you can make it clearer. Explain the steps that are not just arithmetic/algebraic manipulation (eg “because matrix multiplication is associative”). Point out where you used the information given in the question (eg “we can divide by $c$ here as $c$ is nonzero”). Explain how you got your equations from the information in the question. If you used a theorem, make sure you stated it correctly, and that you checked that the case at hand satisfies the required hypotheses (if this is trivial or given in the question, you should still state it, to demonstrate that you know there’s something that needs checking). Don’t spend longer than a minute on this; if there’s something that needs explaining but you can’t word it, go on to the next question and come back to this at the end.

This may seem hard and time-consuming; that’s why you need to do practice exams. Once you’ve got used to it, you will go through this algorithm without thinking.

- In calculation questions, try to “substitute your answer back in” to check it. It’s easier to spot mistakes this way, than by rereading your work.

- If you have an idea but can’t make it work (or run out of time), write down your idea anyway. If this is the right method, you might get partial credit.

- Don’t write down things that are false but give the correct conclusion, in the hope that the grader doesn’t notice. You’re more likely to be
penalised for the wrong reasoning, as it shows that you don’t understand the material.

A little explanation for my aim-at-your-average-performance philosophy: at Cambridge, we had four year-end exams, and they each covered all topics. In second year each paper had 20 questions, in third year 40, and we were told to “do as much as you can in 3 hours”. Then there was no idea of 100%, as no human can do all 20 questions in 3 hours. (Finishing 5 problems would already put you in the top 30% of the class.) So I took my average performance as a target. And it makes sense: only half the time would you do better than your average, so if you can make it under exam pressure, you’re doing pretty well. If you try to do more than you usually do, you’ll only rush and make careless mistakes (in Cambridge, it was vital to be accurate as possible, because near-perfect answers can score double points).

Amy Pang, 2010