

Maths for Scientists Exam Tips

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Firstly a small disclaimer. This is an unofficial tips sheet. I haven't been told any of this by the lecturer or anyone to do with marking the exams. It's all based on my experience and things I have been told by other lecturers for other (usually maths) courses.

Also, as it is based on my experience, you may not find some things I advise to be helpful. If this is the case, then don't do it! Sorry if this is obvious, but you should try to do what will be most helpful for *you*.

Just in case this is all obvious to you and it seems a bit patronizing, (as you've taken GCSE's/A-Levels/equivalents and must have already been in a fair few exams) then I apologise in advance.

Before the Exam

These are things that you should do before the exam, i.e. during your revision.

- Learn the theorems, i.e. the tests, rules and general results, given in the course, *off by heart*. If the proofs or derivations are examinable these should be learnt as well.
- Learn any (unfamiliar) definitions, e.g. radius of convergence, *off by heart*.

For the previous two points use whatever method you think will work best, and also you should check with the lecturer as to what is examinable. Knowing these are important as, once you can just recite them on demand, they can give you easy marks in the exam.

My method is quite a long one. I create a definition sheet, which is self explanatory, and a theorem sheet, which contains every theorem / result / test / rule from the course, with proofs if they're examinable. I do not include examples, or general waffle, unless I can rephrase it into a concise form. I write them in a way that is clear and makes more sense to me, and I write them all in a consistent style that I like, which is often not how the information was presented.¹ I make sure I understand every last thing that I write,² and writing it all in my own consistent style makes sure that I don't just copy it out.

My reason for doing this is to "cut the crap" out of the course so there is less to remember, and to make the structure of the information clear to me. I use the sheets I've created to test myself repeatedly, to the point when I can

¹I have left details of my style out, as it may not be helpful.

²Which is what takes so long, especially if I didn't quite put as much effort in as I should have during the course

just more or less recite definitions, theorems and proofs *out loud*. I also use the sheets for last minute cramming, which is not recommended for everyone. Remember - do what you think will be helpful.

- Do the example sheets again (*not* looking at your previous answers, so you're not just copying them out). Do *all* the questions, not just the ones that were assessed. Sometimes (but it does depend on the lecturer... and in no way rely on this) the questions on the practice sheets can be very similar to those in the exam.
- Do practice papers, following the guidelines for the real exam below. Some of these are available at

<http://www2.warwick.ac.uk/elearning/projects/exampapers/>.

If it's the same lecturer setting the exams as in previous years, it generally true that the exam will be in a similar style. Check with the lecturer though! If it will be in a similar style this should give you a guide of what exactly you need to know for the exam. Sometimes a lecturer will release a mock exam to practice on as well. I've taken an exam where the same question appeared on the mock exam as the real exam - so doing this may be important (definitely, definitely don't depend on the questions being identical!).

- If you don't understand something, ask someone! Please, please, please don't be embarrassed about not understanding something! Exchange email addresses or telephone numbers with people doing the same course before the holidays so you can ask others. Note that if you are able to explain something to someone else, it usually helps you to further understand and (more importantly for the exam) remember it. Thus asking a fellow student for help can be beneficial to both of you.

Remember you can also always email me (via the form on my web-page if you've lost my email address - although this goes for just people in my examples classes!). You can usually email the lecturer (although try to keep your questions quite direct... they can be busy).

Answering Exam Questions

This advice is actually similar to my advice for answering the weekly question sheets.

- If asked to use a result, state it clearly first. If the question refers to a definition in the course, state that as well. Even if you mess up the rest of the question you may get some marks just for reciting the definition.
- If you think you may need to use a result from the course, state it clearly. You may get marks just for realising you need to use this method, and also marks for stating it correctly.
- State how you are going to do something before you do it. As an example, if you're asked to find the turning points of $f(x)$, then you should state

that the turning points are the solutions to $f'(x) = 0$, and state that you need to solve $f'(x) = 0$ for x to find them. This does two things. Firstly it hopefully makes it clear to you what you have to do to answer a question, and thus keeps your thoughts organized when answering. Secondly, it makes it clearer to the examiner that you know what you have to do - this means marks! Even if you get stuck on the mechanics of the question (in the example above, if you get stuck solving $f'(x) = 0$), you have shown an important understanding of what you have to do.

- If you think one of your answers is wildly wrong, it may be a good idea to say so, and explain why. I'm never sure whether this will actually give marks directly, but I would think that it shows you have at least half a brain, and perhaps get some "benefit of the doubt" marks elsewhere.
- If you are using new variables that aren't introduced in the question, then clearly define them. For instance if you're using the ratio test (clearly state it first) and then define what your a_n term is, *before* you go about finding the ratio of successive terms. Usually something like "Let $a_n =$ [whatever it is in the case of the question]" is enough.
- Make sure you mean what you write down. As an example, a lot of people in their homeworks wrote down things like

$$\lim_{n \rightarrow \infty} a_n \rightarrow c$$

which actually means "the limit of a_n as n tends to infinity, itself tends to c ". There may be times when you need to say something like this, but this did not happen in the assessed questions. What should have been written was

$$\lim_{n \rightarrow \infty} a_n = c$$

or

$$a_n \rightarrow c \text{ as } n \rightarrow \infty$$

or

$$a_n \xrightarrow{n \rightarrow \infty} c,$$

which all mean "the limit of a_n as n tends to infinity is equal to c ".

- Try to write clearly, and set out your working clearly (sorry if it's obvious). As I'm sure you're aware, my handwriting is awful, but I do make an effort to write as clearly as possible in exams. Also, leave lots of space between questions. This will do two things. Firstly it will make it clear to the examiner where one question ends the other begins. Secondly it will give you lots of room to go back and correct or add things later.

Looking over them, it looks as though all the points are just saying to state clearly what you're doing and why at every possible stage, and generally try to make it easy for the examiner to give you marks.

Yes, some exam questions are hard - but if you have jump through all the right hoops before and during the exam, a lot of them should not be that bad, and you can still claim a lot of marks even if you don't manage to get the correct final answer to the question.