Exams - General Structure

Christian Kuehn

In general, all my exams are closed book/notes etc., i.e., just bring a pen and your brain. Although the format is different for written and oral exams, the following remarks apply to both cases. An exam is going to have questions at roughly three difficulty levels / types:

(P1) **Knowledge:** There is a basis of definitions and results that have been acquired during a course. This part tests, whether you have absorbed the main notions and results, i.e., how hard you have studied the fundamentals. Note that it is usually not possible to just remember word-for-word certain statements, instead try to focus on remembering simple rules, the basic notions, statements via mnemonics, etc. Also, it helps to sort out, what you would judge the cornerstones of the course in for each lecture, as those are more likely to be asked. Full proofs from the notes will not be asked; however, knowing the most basic ideas, which have been used in proofs is important as those usually contain techniques relevant for the next two problem types below.

(P2) **Application:** Tools and techniques acquired during the lecture as well as during exercises classes are tested in variations. For example, a typical calculation should be applied for a new example or a standard proof idea should be modified or extended to tackle a new result. These types of questions are important to see, whether you have actually understood the material and methods. In this case, the best strategy is to simply practice calculations, design simple examples yourself, and try to see, whether you can prove statements yourself, which are minor variations of the lecture notes or exercise sheets.

(P3) **Transfer:** This is the last, and most difficult, part of the exam. Although doing extremely well on the first two parts certainly suffices to pass and even to obtain a good grade, there has to be a part, where deeper understanding of the material is tested. In this context, the questions are going to ask for combinations of methods, the discovery of certain small new steps, or spotting a not-so-standard calculation. There is no real practice for this part, except just trying to study hard for (P1)-(P2) and be at a good general mathematical fitness level.

Although no detailed decomposition can be made for each exam, in most cases, (P1)-(P2) are going to cover somewhere between 75 to 85 percent of the exam. The last 15 to 25 percent are covered by (P3).

This exam structure has proven to be reasonably successful to achieve multiple goals, the most important one being that you are rewarded based upon the effort you put into the course and into your preparation.

I have also compiled a general collection of hints, how to prepare for exams as an entry on my blog:

`https://practicalscienceblog.wordpress.com/`