The final exam is scheduled for Monday, 17 December 2012, at 1:30-3:30pm. I'll announce in class (and post on Moodle) who will be assigned to take the final in Fraser 102, and who will take the exam in Physics (Tate) 170. At 120 minutes, the final is roughly 2.5 times the length of our 50 minute midterm exams. It covers Sections 1-8, 10-14, 16-18 and 32-34, but the same exceptions apply as on the second midterm:

- The only thing you need to know from Section 14 is that a subset S of $\mathbb{R}$ is *compact* if and only if it is closed an bounded. Therefore any questions about compact sets are really questions about when a set is closed and/or bounded.
- In Section 11, you do not need to memorize the axioms definite an ordered field. The field $\mathbb{F}$ of rational functions will not appear on the final exam, either.

Before giving general advice about studying for the final, a few words about Sections 33 and 34 are in order. Because those sections were not covered on earlier midterms and are only appearing on the final exam, you can expect any problems from those sections to be relatively straightforward—for example, a reasonably clean calculation of the interval of convergence for a given power series, as opposed to a long involved proof of a theorem. However, you should not neglect studying for these problems. Historically it's common for 3283 students in December to think, *it's the end of the semester, and I'm busy with projects in other classes, and I've already learned about series and power series before, so I can skip a few classes*, and then also not study for those topics before the final exam. **Please don't fall into this trap!** Even if you've covered power series in depth before, it's easy to get tripped up on a convergence calculation if you haven't done many of them recently.[1] The hope is for everybody to get all of the points on these questions; you don't want to lose credit on the straightforward problems.

The best advice I can give about studying for the final is the same that I've given for previous midterms: you should learn the definitions and theorems, but **there is no substitute for *doing* problems**. It's easy to listen to an instructor solve a problem, but that's much different than being able to do it on your own, under time pressure, and without any notes, textbooks, or other resources. If you work through enough problems out of the textbook, previous exams and homework, you'll walk into the exam with the confidence that (a) you've seen and solved most of the "standard" types of questions you'll see on the final, like a proof of convergence, and (b) you have the skills to work out anything that is slightly different than those standard questions. As an added bonus, by working on problems you'll probably learn the theorems and definitions you need by heart, without a lot of extra effort.

Which problems should you solve? Here's some specific advice:

- Look over all three midterms; solutions will be posted by reading day (Thursday 12/13). Focus on any problems you struggled with. Read the online solutions and ask us questions as needed until they make sense. Then see if you can solve the problem correctly without looking at any notes, books, etc. Then look in the textbook to find any similar problems and solve those.
- Repeat the above process with any homework assignments and writing quizzes. Recall that most of the skills problems were graded for completion, so the lack of a written comment on your returned assignment does not guarantee it was correct; check with the online solutions.
- Once you've looked over previous problems and want to study a particular section, the true/false questions at the beginning of each Exercise set are a good way to check whether you remember the definitions and basic results from the section.
- As mentioned on previous guides, another technique for studying definitions and theorems is to come up with your own examples to learn why certain distinctions and conditions are important. In the Monotone

[1] Quick: without thinking or looking it up, given $\sum a_n x^n$ is the radius of convergence $R = \lim \left|\frac{a_{n+1}}{a_n}\right|$ or $R = \lim \left|\frac{a_n}{a_{n+1}}\right|$?

Convergence Theorem, why is it important that the sequence is bounded? In the topology section, why would a set which does not include one of its boundary points not satisfy the definition of closed set?

- Don't set out to memorize the proof of every theorem in the book. There are certain standard proofs involving open/closed sets, intersections/unions/complements of sets, etc., but in general if a proof is on the exam, you should be able to figure it out using definitions and other given information. [In other words, if I ask you to prove the composition of two surjective functions is surjective (assuming the domains/ranges match up, etc.), then you can figure that out from the definition of surjective function and not by having memorized the proof of Theorem 7.19(a) and reproducing it word for work on the exam.]

- It's easier and more fun to study the problems that we're good at, but in the long run you'll get more benefit from doing the kinds of problems you didn't like, even if it's a struggle. If you get stuck, ask us for help!

Here are a few suggested problems from the sections that historically give people the most trouble in this class. (This list isn't meant to be comprehensive, and you shouldn't ignore the other sections. There's also some overlap here with previous assignments.)

§6: 6.14, 6.22, 6.24, 6.26

§7: 7.9, 7.10, 7.11, 7.16, 7.17

§8: 8.3(a,b,c), 8.4, 8.11

§10: 10.7, 10.15, 10.19

§11: 11.6, 11.7

§12: 12.3/12.4(b, c, d, l, m)

§13: Theorem 13.10, Corollary 13.11, 13.11