PURE MTH 3002 Topology & Analysis III (3246)

Notes on the Exam

I won't specify a consulting time before the exam but I will be in Adelaide all the time up to the exam and happy to talk. Sometimes I will work at home so if you are coming in just to see me check first. Remember my office phone number is 8303 4174 and my email is `mmurray@maths.adelaide.edu.au`. Email is the most reliable way to contact me.

The exam will be similiar in format to the practice exam. Ten questions of approximately 10 marks each. The questions will be of a similar style and level of difficulty. I will not be asking you to prove 'big' theorems but just testing that you know and understand the definitions and statements of theorems, can do 'small' proofs of the kind in the practice exam and can work with examples.

Any of the material we have covered in the lectures or the assignments is examinable except as discussed below. The numbers below refer to the Summary. (Note that the Outline I handed out at the beginning is wrong in terms of what we did and did not cover.)

1 Sets, Functions and Relations. Obviously you need to understand this material to do many of the latter parts of the course. But I will not examine it directly. I will not ask you to show anything is an equivalence relation. I will not ask you to show that anything is countable

2 The real numbers. I don't expect you to memorise the axioms *except* for the Least Upper Bound Axiom and associated definition likes supremum and infimum, upper bounds etc. I don't expect you to prove any of the properties of the reals like the Archimedean Property or that between any two reals there is a rational. I would expect you to know that these things are true though. But you probably knew them before you did this course!

2.6 Liminf and limsup. I won't ask you anything specifically about $\liminf$ or $\limsup$.

I won't ask you to prove that the real numbers are complete (Proposition 2.15) but I will expect you to know it.

3.1 Norms on $\mathbb{R}^n$. I won't expect you to prove Young's, Holder's or Minkowski's inequality. I won't expect you to know Young's or Holder's inequality but you should know Minkowski's inequality as its part of the fact that $\| \|_p$ on $\mathbb{R}^n$ is a norm. You should definitely know Cauchy's inequality.

3.3 Orthonormal sets. I won't expect you to know anything about orthonormal sets.

5.1 Compactness and continuity. The notion of uniform continuity is examinable but equicontinuity and the Arzela-Ascoli theorem are not.

6 Topological spaces. I won't ask you anything about topological spaces specifically. Obviously they have some things in common with metric spaces and that stuff is examinable.

6.1 Connectedness. I won't ask about connectedness.

7. Hilbert space. I will not examine anything after Theorem 7.7 the Reisz Representation Theorem. The Reisz Representation Theorem is examinable. I would expect you to know that ℓ_2 is complete but I would not expect you to be able to prove it.

Assignment 1 As I have already noted I won't ask equivalence relation questions.

Assignment 6 You don't need to know the definition of Fredholm or index. It was just something for you to calculate. As noted above adjoints are not examinable.