

Sample Questions from Past Qualifying Exams

This list may give the impression that the exams consist of a series of questions fired at the student one after another. In fact most exams have more the character of a conversation with considerable give and take. Hence this list cannot be expected to indicate accurately the difficulties involved.

The list indicates the professor associated to each question where available. Some have been in the MGSA files for a while, and this information has been lost (if it was ever there).

The listing by section is approximate, since some questions may fit under more than one heading.

General Topology

- State the definition of compact and all “smaller” versions of compact: locally compact, sequentially compact, etc., along with their definitions. [**Sarason**]
- Is the Arzela-Ascoli Theorem reversible? Why or why not? [**Sarason**]
- Define limit point, accumulation point and cluster point. [**Sarason**]
- Why or why not is the definition of compact equivalent to the definition of complete? Give examples of spaces which are one but not the other, or prove one implies the other if given a specific type of space. [**Sarason**]
- In what kind of space is a unique cluster point a limit point? [**Sarason**]
- What do you think is a reasonable definition of a bounded metric space? Prove that every compact metric space is bounded under that definition. [**Arveson**]
- Talk about the Baire Category Theorem; give an application. [**Sarason**]
- Describe the Uniform Boundedness Principle. [**Sarason**]
- Talk about the Weierstrass Approximation Theorem. Is the set of continuous functions from a compact subset of \mathbb{R}^n to the reals a separable set? [**Sarason**]