

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.

Dynamical Systems

- What is a shift of finite type? a sofic shift? give an example of each.
- Give an example of a subshift which is not sofic.
- What is the Morse shift? Show it is not sofic.
- Define the zeta function. State a theorem characterizing zeta functions of shifts of finite type and sofic shifts.
- Calculate the zeta function for some standard examples.
- What is (topological) entropy? Explain how to compute the entropy of a subshift. Give a formula for the entropy of a sofic shift. Prove the formula is correct.
- Sketch Lind's proof that every Perron number is the spectral radius of a primitive non-negative integral matrix.