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.

Computational Complexity

- Define BPP. How does BPP relate to other complexity classes? [**Vazirani**]
- What does $\mathrm{NP} = \mathrm{P}(\mathrm{P}(\log n, 1))$ mean? [**Vazirani**]
- Characterize $\mathrm{NP} \cap \mathrm{coNP}$.
- Define the complexity classes PP and NP.
- What is a nondeterministic Turing machine?
- What is an NP-hard problem? What is an example?
- Define PSPACE.
- What is the relationship of NPSPACE and PSPACE?
- Define LOGSPACE. What is strange about it?
- Give containment relationships among the complexity classes named so far.
- What is a search problem? An enumeration problem?
- What is the complexity class associated to enumeration problems?