Mathematics 243, section 1 – Algebraic Structures
Information on Exam 1
September 22, 2006

General Information

As announced in the course syllabus and the schedule on the course homepage, the first exam this semester will be given Friday, September 29. The exam will cover the material we have discussed since the start of the semester, through the material on matrix operations from class on September 22. The topics to review are:

1) Sets, set operations: union, intersection, complement, set difference, Cartesian products and their properties
2) Mappings (functions), the domain and range, direct and inverse images, injectivity and surjectivity
3) Binary operations, the properties of associativity, commutativity, existence of identity elements and inverses, what it means for a subset of a set to be closed under a binary operation
4) Composition of functions, identities and inverses for composition
5) Matrix sums and products, and their properties.

Practice Problems

The exam will consist of 4 or 5 problems (each possibly having several parts). Some questions will be computational, some will ask for definitions and/or (short) proofs. The questions will be similar to parts of the following questions from Gilbert and Gilbert:

1) Section 1.1: 5, 19, 23, 31, 33
2) Section 1.2: 3, 4 (be prepared to give complete proofs of injectivity and surjectivity in cases like this), 13, 21 (also review 22 from the first problem set).
3) Section 1.3: 3, 4, 5, 6
4) Section 1.4: 2fg, 3, 10
5) Section 1.5: 1de, 2de, 4, 5
6) Section 1.6: 2, 3, 4, 12, 20 (note: the (aa) row can be either the first or the second row of the matrix).

Suggestion on How To Prepare

Read over your notes from class (several times, if necessary!). Make sure you can follow all the steps in proofs and examples. Review the problems from the problem sets, and pay particular attention to any problems you missed the first time.

After you do that, try some of the practice problems above.

When you feel prepared, select four or five of the problems above (maybe just one or two parts for the ones with lots of parts), mixing several computational ones and some

proofs. Give yourself a practice exam using those problems, timing yourself to make sure you can work under time pressure.

Review Session

I will be happy to run an evening review session before the exam. Either Tuesday or Wednesday evening would be OK.