Format and topics for final exam
Math 142

General information. The final exam will be a timed test of 2 hours and 15 minutes. The exam will be comprehensive, but more recent material (specifically sections 7.5 and 8.1–8.2) will be given greater emphasis. No books, notes, calculators, etc., are allowed. Most of the exam will rely on understanding the problem sets (including problems to be done but not to be turned in) and the definitions and theorems that lie behind them. If you can do all of the homework, and you know and understand all of the definitions and the statements of all of the theorems we've studied, you should be in good shape.

You should not spend time memorizing proofs of theorems from the book, but you should defintely spend time memorizing the *statements* of the important theorems in the text. The final exam will feature the usual types of questions, including reciting definitions and theorems, and proofs.

General note on topics. The topics covered by the final exam include all of the topics listed on the handouts for Exams 1–3 and the topics listed below. Again, material from sections 7.5 and 8.1–8.2 will be given greater emphasis.

Theorems, results, algorithms. The most important new theorems, results, and algorithms we have covered are listed below. You should understand all of these results, and you should be able to cite them as needed.

Sect. 8.2: Inclusion-exclusion (Thm. 1) and corollary.

Types of computations. You should also know how to do the following general types of problems.

Sect. 7.5: Solving recurrence relations using generating functions (Exs. 1, 2, 3).

Handout on recurrence relations: The method of generating functions.

Sect. 8.1: Inclusion-exclusion on 1, 2, or 3 sets. Set union variation of inclusion-exclusion.

Sect. 8.2: Inclusion-exclusion on n sets (summations); set union version (Cor. to Thm. 1).

You may also find it useful to review the following important examples from the text:

Sect. 7.5: Solving recurrence relations using generating functions (Exs. 1, 2, 3).

Sect. 8.1: Relatively prime numbers (Ex. 4: know elementary number theory), inclusion-exclusion on 3 sets with all single, double, triple intersections the same size (Ex. 5).

Sect. 8.2: Inclusion-exclusion with all k-tuple intersections the same size (Ex. 1, 2); derangements/retrieving hats (Ex. 4: use of summation notation).

Not on exam. Sect. 7.5: Exs. 4 and 5. Sect. 8.1: Non-standard constraints (Ex. 6). Sect. 8.2: Graph coloring (Ex. 5), generalization of inclusion-exclusion (Thm. 2).

Good luck.