**Topics for Final Exam**
**Math 42, Fall 2014**

**General information.** The final will be a little less than twice as long as our in-class exams, with 135 minutes in which to complete it. It will take place in our usual room. As usual, no books, notes, calculators, etc., are allowed.

The final will be **cumulative**; in other words, the final will cover the topics on this sheet and also on the previous three review sheets. However, the exam will somehwat emphasize the material listed here from Chapters 10, 11, and 14. As always, most of the exam will rely on understanding the homework and quiz problems and the definitions and theorems that lie behind them. If you can do all of the homework and quizzes, 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, though understanding those proofs may help you understand the theorems. On the other hand, you should defintely spend time memorizing the *statements* of the important theorems in the text.

As mentioned above, your first priority should be to understand the homework and quizzes and the ideas behind them. Besides the list of topics you should know, below, you should also be familiar with everything specially emphasized in the text. You should also study the Check Yourself problems and Try This problems in Chs. 10, 11, and 14.

**Statements of definitions.** On at least one question, you will be asked to recite one of the definitions listed below (the italicized words under the **Definitions:** headings) or in the previous review sheets.

**Section 10.2. Definitions:** *connected, cycle, tree.* Ex. 4.2.5: If a tree has $n$ vertices, then it has $n-1$ edges. Partial converses to Ex. 4.2.5 (Thms. 10.2.1, 10.2.2; Cor. 10.2.3). Theorems about leaves (10.2.4, 10.2.5).

**Section 10.3. Definitions:** *spanning tree, weights, weighted graph.*

**Section 10.4. Definitions:** *greedy algorithm.* Algorithms for finding spanning trees: Start big, start small. Finding minimum-weight spanning trees: Kruskal's algorithm, Prim's algorithm, start big.

**Section 11.2. Definitions:** *planar, faces.*

**Section 11.3.** Sum of sizes of faces of a planar graph (Thm. 11.3.1).

**Section 11.5.** Euler's formula (Thm. 11.5.1).

**Section 11.6.** Planarity conditions (Thms. 11.6.1–11.6.4, 11.6.6). Nonplanar examples: $K_5$ and $K_{3,3}$ (Thm. 11.6.5).

**Section 14.2. Definitions:** *probability, state space/sample space, event.* Probability axioms (Defn. 14.2.6). Examples.

**Section 14.3. Definitions:** *random variable, probability distribution, expected value.* Examples of random variables, expected value.

**Section 14.5. Definitions:** *conditional probability* $P(E_1 \mid E_2)$*, independent, exclusive.* Computing conditional probabilities; determining if events are independent. Using PIE in probability. Indpendence vs. exclusivity.

**Section 14.7.** Expected value is additive (Thm. 14.7.1).

**Not on exam:** Proofs of Euler's formula in Sects. 11.4–11.5. (Sect. 11.6) Thickness of a graph (pp. 322-323). (Sect. 14.7) The probabilistic method (subsection 14.7.1).