Our second prelim will be Monday, November 11 in class. The exam will be 50 minutes and will consist of short answer questions. It will be cumulative, covering all material up to and including the lecture of November 6 with emphasis on the material since the first prelim. The latter material is covered in the following chapters and sections of the course text: 6.1-6.5, 7.1-7.4, 8.1-8.2, 8.4-8.6, with primary focus on Chapters 6 and 7. In addition, there may be one or two questions on material tested on the first prelim; see the Prelim 1 review sheet for coverage.

1. Chapter 6 covers counting techniques. You should be thoroughly familiar with the following concepts: permutation, r-permutation, r-combination, Pascal's triangle, binominal coefficient, multinomial coefficient, Stirling numbers of the second kind, inclusion-exclusion principle, pigeonhole principle, generalized pigeonhole principle, rule of product, rule of sum, Pascal's identity, binomial theorem, multinomial theorem, Vandermonde's identity, stars and bars argument.

   You should know how the above concepts are used in counting and how to apply them.

   You should know what the notations $P(n,k)$, $C(n,k)$, $\binom{n}{k}$, $S(n,k)$ stand for.

   Study the Review Questions on pp. 439-440. Practice problems:
   pp. 396ff: 1, 3, 35, 37, 45, 47, 63
   pp. 405ff: 5, 9, 13, 19, 35
   pp. 413ff: 3, 7, 9, 19, 23, 27, 33, 41
   pp. 421ff: 5, 7, 20, 29, 31
   pp. 432ff: 1, 9, 11, 19, 21, 33, 51, 55

2. Chapter 7 covers basic discrete probability theory.

   You should know the definitions of the following concepts: outcome, sample space, event, probability of an event, probability distribution, uniform distribution, conditional probability, inclusion-exclusion law, independent events, pairwise independent events, random variable, expected value of a random variable, independent random variables, variance, standard deviation, Bernoulli trials, Bayes' theorem, Markov's inequality, Chebyshev's inequality.

   You should know about linearity of expectation and, for independent random variables, linearity of variance.

   Study the Review Questions on p. 495. Practice problems:
   pp. 451ff: 5, 13, 17, 29, 37, 41
   pp. 463ff: 5, 7, 11, 13, 17
   pp. 475ff: 1, 13
   pp. 492ff: 1, 3, 5, 8, 13, 27, 29, 35, 47, 49

3. Chapter 8 covers recurrence relations, generating functions, and the inclusion-exclusion principle. We have not covered the latter two topics in lecture, but you should at least know the definitions.

   You should know what a recurrence relation is. You should know what a homogeneous or nonhomogeneous linear recurrence of degree k is, and what the general solution looks like. You should know what the Catalan numbers are, what they are good for, and the recurrence relation they satisfy. You should know what a generating function is. You should be able to state the principle of inclusion-exclusion.

   You should be able to write down recurrences for simple problems involving inductively defined objects.

   Study the Review Questions on p. 566. Practice problems:
   pp. 510ff: 1, 7, 11, 13
   pp. 524ff: 1, 7, 11