Theory to learn for first exam.

George

March 12, 2004

Two of the *following questions* will be on the exam:

1. State and prove the Generalized Pigeonhole Principle. (Theorem 2, page 314)
2. Prove that every sequence of $n^2 + 1$ distinct real numbers contains a subsequence of length $n + 1$ that is either strictly increasing or strictly decreasing. (Theorem 3, page 317)
3. Give a formula and a proof for the number of r-combinations of a set with n elements. (Theorem 2, page 322)
4. Give a combinatorial proof of Pascal's identity. (Theorem 2, page 330)
5. State and prove via a combinatorial argument Vandermonde's Identity. (Theorem 3, page 331)
6. Give a formula and a proof for the number of r-combinations from a set with n elements when repetition of elements is allowed. (Theorem 2, page 337)
7. Prove that the number of different permutations of n objects, where there are n_1 indistinguishable objects of type 1, n_2 indistinguishable objects of type 2, ..., and n_k indistinguishable objects of type k, is $\frac{n!}{n_1!n_2!...n_k!}$. (Theorem 3, page 340)

In addition, **three problems** out of your *first two homework sets* will be chosen to complete the five questions on your exam.