Math 461 Fall 2006 Section C13 **Homework #14**

Final Exam: Thurs, Dec 14, 8:00am–11:00am, Altgeld Hall Room 443

1. (2 pts) Chapter 7, problem 50.
2. (3 pts) Chapter 7, problem 75.
3. (1 pt) Chapter 8, problem 4.
4. (4 pts) Flip a fair coin n times. Prove that the length of the longest constant run in the resulting list of heads and tails is $(1 + o(1)) \log_2 n$. In other words, for every $\varepsilon > 0$, almost no list has at least $(1 + \varepsilon) \log_2 n$ consecutive identical flips, and almost every list has at least $(1 - \varepsilon) \log_2 n$ consecutive identical flips. Remember that "almost all" and "almost no" mean as $n \to \infty$. (*Hint*: Use Markov's Inequality for the first part and Chebyshev's Inequality for the second part.)