Homework 6

Recitation problems for Monday, 3/6/06

1. The question from class on 3/1/06: compute the expectation $E(|S_n|)$ when S_n is the sum of independent, uniform ± 1 random variables. There were two steps to work out – converting from the summation to the single term form, and applying Stirling approximation.
2. Problems 4, 7, p. 11 of Alon and Spencer.
3. Problems 2, 3, 8, p. 21 of Alon and Spencer.
4. Show that for any n sufficiently large, there exists a graph G on n vertices with chromatic number at least $n/2$ with clique number at most $n^{3/4}$. Chromatic number is the smallest number k such that the vertices of the graph can be partitioned into k parts with no edges inside any part. Clique number is the size of the largest clique (complete subgraph) in the graph. (Hint: What can you say about the chromatic number of the complement of a triangle-free graph?)

Written problems for Wednesday, 3/8/06

1. Compute $E(S_n^2)$ and $E(S_n^4)$, where S_n is the sum of independent, uniform ± 1 random variables. ($S_n = \sum_{i=1}^n X_i$, where the X_i's are independent and uniformly chosen to be ± 1.)
2. Choose one of the following problems. Either #5 or #7 on p. 21 of Alon and Spencer, whichever you did not work for 3/1/06, or #9 on p. 21 of Alon and Spencer.