CS 70 SPRING 2007 — DISCUSSION #15

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1. Administrivia

(1) Course Information
  - Homework 10 is graded.

2. Chernoff Bound

Exercise 1. A spider is expecting guests and wants to catch 500 flies for her dinner. Exactly 100 flies pass by her web every hour. Exactly 60 of these flies are quite small and are caught with probability 1/6 each. Exactly 40 of the flies are big and are caught with probability 3/4 each. Assume all fly interceptions are mutually independent.

We are trying to find a bound on the probability that the spider catches at least 500 flies in 10 hours.

(1) What would the Markov bound be on the probability that the spider will catch her quota of 500 flies?
(2) What would the Chebyshev bound be on the probability that the spider will catch her quota of 500 flies?
(3) What would the Chernoff bound be on the probability that the spider will catch her quota of 500 flies?

3. Diagonalization

Exercise 2. (Cantor, 1880) Prove that for every set S, $\mid S \mid < \mid 2^S \mid$.

Exercise 3. Recall the proof of undecidability of Halting Problem.