CS 70 SPRING 2007 — DISCUSSION #13

ALEX FABRIKANT

1. ADMINISTRIVIA

(1) There will be an extra, optional "recitation" weekly section starting next week. Check course webpage on Saturday evening for details.
(2) Homework 10 has been posted; it's due on Tuesday, 4/24

2. GEOMETRIC DISTRIBUTION

$$X \sim \text{Geo}(p) : \Pr(X = k) = (1 - p)^{k-1} p$$

Exercise 1. James Bond is imprisoned in a cell from which there are three possible ways to escape: an air-conditioning duct, a sewer pipe and the door (which is unlocked). The air-conditioning duct leads him on a two-hour trip whereupon he falls through a trap door onto his head, much to the amusement of his captors. The sewer pipe is similar but takes five hours to traverse. Each fall produces temporary amnesia and he is returned to the cell immediately after each fall. Assume that he always immediately chooses one of the three exits from the cell with probability $\frac{1}{3}$.

(1) What is the probability of escaping after seven attempts?
(2) On the average, how long does it take before he realizes that the door is unlocked and escapes?
(3) After every successful escape, he's recaptured and reincarcerated with probability 50% during any given hour. What's the expected time until his 3rd successful escape?

3. CONTINUOUS RANDOM VARIABLES

Exercise 2. Let X be a random variable with probability density function $f(x) = \frac{1}{(1+x)^2}$. Compute:

(1) P(X¿3)
(2) You sample from this distribution 4 times, so X_1, X_2, X_3, and X_4 are iid with distribution f(x). What's P(N=2)?
(3) Find $E(X)$.