COS 341, October 17, 2001

Due: November 7, 2001

# Homework Set 5

**Reading Assignments** Finish reading Chapter 7.

**Written Assignments**

Do exercises 2, 12 and 22 in Section 7.8.

Do the following problems:

*Special Problem 1* (to be counted as 1 exercise) In the Math Casino Problem, suppose $N = t^5$ where $t > 0$ is an integer. The new rule is that a random $1 \leq n \leq N$ will be a winner for you if $\lfloor n^{1/5} \rfloor$ divides $n$. What is $p$, the probability that a random $n$ is a winner? Give the answer as a closed-form expression involving $t$.

*Special Problem 2* (to be counted as 2 exercises) In the National Basketball Association finals, the format is for the two teams to play a *best-of-seven* series. That is, the series stops whenever one team has accumulated 4 wins. Assume that the outcome of each game is like a random fair coin toss, i.e. each team has a 50% chance of winning that game, independent of what has happened so far in the series. Questions:

(a) Give an explicit description of the probability space $\Omega = (U, p)$.

(b) What is the probability of a series going into the seventh game?

(c) Let $X$ denote the random variable corresponding to the number of games played in the series. What is $E(X)$? What is $Var(X)$?

(d) Let $n$ be any odd positive integer. What is the probability of a best-of-$n$ series going into the $n$-th game? (Again we assume that the outcome of each game is like a random fair coin toss.)