

# Section 10

Monday, July 29

CS 70: Discrete Mathematics and Probability Theory, Summer 2013

1. You roll 2 ordinary dice, and let  $X$  denote the maximum of the two numbers you get. What is the distribution of  $X$ ? What is the expectation of  $X$ ? You may use the facts that  $\sum_{i=1}^n i = \frac{n(n+1)}{2}$  and  $\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$ .
2. Reese Prosser never puts money in a 25-cent parking meter in Hanover. He assumes that there is a probability of 0.05 that he will be caught (each attempt is independent). Assume each offense that is caught costs him \$10. Under his assumptions:
  - 2a. How does the expected cost of parking 10 times without paying the meter compare with the cost of paying the meter each time?
  - 2b. If he parks at the meter 10 times without paying the meter, what is the probability he will end up paying more than he would have had he lawfully paid the meter 25-cents each time? Is this probability greater than or less than 1/2?
3. A drawer contains 10 socks, where 6 of them have holes and 4 of them do not. Suppose you pull two random socks out of the drawer, look at them, and then put them back. If you do this 5 times, what is the probability that you pull out a pair with no holes precisely 4 out of 5 times?
4. Consider a random graph (undirected, no multi-edges, no self-loops) on  $n$  nodes, where each possible edge exists independently with probability  $p$ . Let  $X$  be the number of isolated nodes (nodes with degree 0). What is  $E(X)$ ? Why isn't  $X$  a binomial distribution?