Section 8

Monday, July 22

CS 70: Discrete Mathematics and Probability Theory, Summer 2013

1. Out of 1000 computer science students, 400 belong to a club (and may work part time), 500 work part time (and may belong to a club), and 50 belong to a club and work part time.

   1a. Suppose we choose a student uniformly at random. Let C be the event that the student belongs to a club and P the event that the student works part time. Draw a picture of the sample space Ω and the events C and P.

   1b. What is the probability that the student belongs to a club?

   1c. What is the probability that the student works part time?

   1d. What is the probability that the student belongs to a club AND works part time?

   1e. What is the probability that the student belongs to a club OR works part time?

2. Suppose you roll an ordinary die 5 times.

   2a. What is the probability of getting at least one six?

   2b. What is the probability of getting exactly two sixes?

   2c. What is the probability of getting a prime number of sixes?

3. Suppose you record the birthdays of a large group of people, one at a time until you have found a match, i.e., a birthday that has already been recorded.

   3a. What is the probability that it takes more than 20 people for this to occur?

   3b. What is the probability that it takes exactly 20 people for this to occur?

   3c. Suppose instead that you record the birthdays of a large group of people, one at a time, until you have found a person whose birthday matches your own birthday. What is the probability that it takes exactly 20 people for this to occur?

4. Suppose you select, uniformly at random, a sequence of nonnegative integers $x_1, x_2, \ldots, x_{10}$, each of which is ≤ 500. What is $\Pr\left[\sum_{i=1}^{10} x_i = 437\right]$?