Illinois Institute of Technology
Department of Computer Science

CS 330 Discrete Structures

Fall Semester, 2010

Quiz 5

In Class

1. What is the probability that Bo, Colleen, Jeff, and Rohini win the firt , second, third, and fourth prizes, respectively, in a drawing if 50 people enter a contest and

   (a) no one can win more than one prize.

   (b) winning more than one prize is allowed.

   Solution:

   (a) $1/(50 \cdot 49 \cdot 48 \cdot 47)$

   (b) $1/50^4$

2. Find the probability that a randomly generated bit string of length 10 does not contain a 0 if bits are independent and if

   (a) a 0 bit and a 1 bit are equally likely.

   (b) the probability that a bit is a 1 is 0.6.

   (c) the probability that the ith bit is a 1 is $\frac{1}{2^i}$ for $i = 1, 2, 3, \cdots, 10$.

   Solution:

   (a) $1/2^{10}$

   (b) 0.6^{10}

   (c) $\prod_{i=1}^{10} \frac{1}{2^i}$

3. What is the expected sum of the numbers that appear when three fair dice are rolled?

   Solution: Let X_i be the number appears when the ith fair dice is rolled. Then $E(X_i) = \frac{1}{6}(1 + 2 + 3 + \cdots + 6) = 3.5$. The expected sum of the numbers that appear when three fair dice are rolled is $E(X_1 + X_2 + X_3) = E(X_1) + E(X_2) + E(X_3) = 3 \cdot 3.5 = 10.5$.