Homework 9

Mathematics in Computer Science

1. What is the expected time to draw the integer 1 from the set $\{1, 2, \cdots, n\}$ with replacement?

2. What is the expected time to draw all integers from 1 to n with replacement?

3. In a random hand of five cards in poker, what is the probability of having (a flush) five cards of the same suit?

4. (a) Role a k-sided dice three times. How many possible outcomes are there?

   (b) What is the probability of the same face (number) of the k-sided dice appearing exactly two times in the three roles?

   (c) If it were a 6-sided dice what is the probability of the same face appearing exactly two times?

   (d) What is the probability of the same face appearing three times?

   (e) What is the probability of the no face ever appearing twice?

   (f) What is the sum of the above three probabilities?

5. If E and F are independent events, prove that $\overline{E}$ and $\overline{F}$ are independent events.

6. (a) What is the probability that two people chosen at random were born on the same day of the week?

   (b) What is the probability the in a group of n people chosen at random, there are at least two born on the same day of the week?

   (c) How many people chosen at random are needed to make the probability greater than 1/2 that there are ar least two people born in the same month of the year?

7. Suppose that 8% of players use steroids, that a player tested for steroids who is on steroids tests positive 96% of the time, and that a player not on steroids tests positive 9% of the time. What is the probability of a player who tests positive actually takes steroids?

8. Give three events A, B, and C where each pair of events are statistically independent but the three events are not three way independent?

9. For a set of n events what is the difference between the events being independent and the events being pairwise independent?