CS 441: Discrete Structures for Computer Science

Spring 2020

Sections 7.1 and 7.2

Name: _____ **Username (abc123):** _____

Recitation (circle one):

1. For the following problems, assume you have a standard deck of 52 cards (4 suits for each of 13 ranks). Find the probability that a five-card poker hand:

   (a) contains the two of diamonds, the three of spades, the six of hearts, the ten of clubs, and the king of hearts.

   (b) does not contain the queen of hearts.

   (c) contains two pairs. That is, the hand has two cards of one rank, two cards of a second rank, and a fifth card of a third rank.

2. What is the probability that a fair die never comes up an even number when it is rolled six times?

3. Consider a lottery where six winning numbers are picked from the range of 1 to 50, inclusive. The order of the numbers does not matter. Find the probability of:

   (a) picking all six winning numbers

   (b) picking exactly three of the winning numbers

4. A group of 6 people go out to lunch, and decide to play the game "odd person out" to determine who will pay. Each person flips a fair coin. If there is a person whose outcome is not the same as that of any other member of the group, this person has to pay for everyone's lunch. For example, if one person gets tails and everyone else gets heads, the person with tails pays. What is the probability that there is an odd person out after the coins are flipped once?

5. What is the conditional probability that a randomly-generated bit string of length four contains at least two consecutive 0s, given that:

   (a) the first bit is a 1?

   (b) The third bit is a 0?

6. Find the probability that a family with four children has two or three girls, if the chance of having a boy is 30%. Assume the sexes of each child are independent.