

Problem Session 5

CPSC 202a

October 23, 2006

Probability

1. What is the probability that a five-card poker hand contains a straight flush? (a flush is 5 consecutive cards of the same suit).
2. If E and F are independent events, are \bar{E} and \bar{F} also independent? Justify your answer.
3. Assuming birthdays on each day of the week are equally likely
 - What is the probability that two people chosen at random were born on the same day of the week?
 - What is the probability that in a group of n people chosen at random, there are at least people two born on the same day of the week?
 - How many people chosen at random are needed to make the probability greater than $\frac{1}{2}$ that there are at least two people born on the same day of the week?
4. A space probe communicates with earth using bit strings. Suppose that in its transmission, $\frac{1}{3}$ of the time it sends a 1 and $\frac{2}{3}$ of the time it sends a 0. When a 0 is sent, the probability it is received correctly is 0.9 (otherwise a 1 is received). When a 1 is sent, the probability it is received correctly is 0.7 (otherwise a 0 is received). What is the probability a 0 is received? What is the probability that a 0 was transmitted given that a 0 was received?
5. Let X and Y be random variables that count the number of heads and the number of tails that come up when two coins are flipped (once). Are X and Y independent? Justify your answer.
6. Suppose we toss a fair coin until two consecutive heads come up. What is the expected number of tosses we make?