MAT 271E – Homework 2

Due 02.03.2011

1. There are 8 pairs of shoes in a cabinet (a total of 16 shoes). We pick 8 shoes randomly. What is the probability that there is at least 1 complete pair?

2. A gambler tosses a coin three times. Each time a 'Head' comes, he gains 1 TL and each time a 'Tail' comes he loses 2 TL. Suppose that the coin is biased and the probability of 'Heads' is p. Assume also that the tosses are independent. Compute the probability that he doesn't lose money.

3. Suppose that two events A and B are independent. Let B^c denote the complement of B. Show that A and B^c are also independent. (Use the definition of independence and the probability axioms.)

4. A gambler has two coins in his pocket. One of them is fair and the other is biased so that the probability of 'Heads' is 0.6. He randomly picks one of the coins and starts tossing. Assume that the tosses are independent.

   (a) Suppose that the result of the first toss is a 'Head'. What is the probability that the coin in the gambler's hand is biased?

   (b) Suppose that the result of the first two tosses are both 'Heads'. What is the probability that the coin in the gambler's hand is biased?

5. You roll a fair die 20 times. Assume that the rolls are independent.

   (a) What is the probability that exactly 8 of the rolls turn out to be 6?

   (b) What is the probability that exactly 7 of the rolls turn out to be 6 and 9 of the rolls turn out to be odd?

6. We randomly select 9 cards from a 52-card deck.

   (a) What is the probability of selecting exactly 3 aces?

   (b) What is the probability of selecting exactly 3 aces, or exactly 2 kings, or both?