MATH 2113/CSCI 2113, Discrete Structures II
Winter 2008
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Homework Sheet 3
Due: Wednesday 30th January: 1:30 PM

Compulsory questions

1 (a) What is the probability that a randomly dealt 5-card poker hand is a straight? [But not a straight-flush.]

(b) What is the probability that a randomly chosen 5-card poker hand contains exactly one king?

2 How many numbers between 100 and 1000 inclusive are divisible by at least one of 2, 3 or 5?

3 Suppose we have 3 dice: one red, one blue, and one green, and we roll all 3, what is the probability that the number on the green die is at least as big as either of the other numbers, and the number on the red die is no bigger than either of the other numbers? i.e. red $\leqslant$ blue $\leqslant$ green.

4 A fair coin is tossed 5 times.

(a) What is the probability that the sequence HHH occurs (consecutively) somewhere in the 5 tosses?

(b) What is the probability that the sequence THT occurs (consecutively) somewhere in the 5 tosses?

5 n fair dice are rolled.

(a) What is the probability that the highest number shown is a 5?

(b) For which value of n is this probability greatest? [Hint: compare probabilities for consecutive values of n, to see if they are increasing or decreasing.]

6 In the game Craps, played in casinos, the player first rolls 2 dice and adds them. If the total is 7 or 11, the player wins. If the total is 2, 3 or 12, the player loses. If the total is anything else (4, 5, 6, 8, 9, or 10) this total is recorded and called the point. Now the player continues to roll two dice until the total is either 7 or is equal to the point. If it is 7, the player loses. If it is the point, the player wins.

(a) Suppose that after the first roll, the point is 5. What is the probability that the player goes on to win? [Assume that the player always eventually rolls either a 7 or the point.]

Bonus question

(b) What is the probability that the player wins overall?