MATH 2113/CSCI 2113, Discrete Structures II
Winter 2008
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Homework Sheet 4
Due: Wednesday 6th February: 1:30 PM

Compulsory questions

1 On a table there are 129 coins, 128 of which are fair, one of which is two-headed (i.e. it always gives heads when it is tossed.) A coin is selected at random from the table and tossed 6 times. It comes down heads each time. What is the probability that it will come down heads the seventh time it is tossed?

2 A gambler starts with \$3. He proceeds to make a series of \$1 bets, each of which has a 0.5 probability of winning (in which case he gets \$1, and his original \$1 back) until he either has \$10 or \$0. What is the probability of his reaching \$10? [Assume that he definitely reaches either \$10 or \$0.]

3 I have a bowl of spaghetti containing n strands (each of which has two ends). I pick up 2 ends at random and tie them together. I repeat this until there are no loose ends in the bowl. What is the expected number of loops in the bowl?

4 I have two urns: the first contains 3 blue balls and 5 red balls; the second contains 4 blue balls and 2 red balls. I pick one ball at random out of each urn and get one red ball and one blue ball. What is the probability that the red ball came from the first urn?

5 3 dice are rolled: which of the following sets of events are independant?

(i) "The numbers are all different." "At least one die is a 6."

(ii) "There is at least one 6." "There are no 4s."

(iii) "At least 2 dice are even." "The dice are all even or all odd." "The total is 16."

6 A and B are two random events. C is the event: Toss a fair coin; either it is H and A occurs, or it is tails and B occurs. [This coin toss is independant of both A and B.] Suppose that C is independant of both A and B. What is the probability of $A \cup B$?