Probability 1, Autumn 2015, Problem sheet 2

To be discussed on the week 12 Oct. . . 16 Oct.

Problems marked with "PrCl" are discussed in the large problem class on Thursday 8 Oct.

Mandatory HW's are marked with "**HW**", they are due on the week 19 Oct. . . 23 Oct, the latest.[1]

Solutions will be available on Blackboard on the 24th Oct.

HW 2.1 A fair four-sided (tetrahedron) die is one that has numbers 1, 2, 3, 4 on its sides, and rolling it results in any of these four numbers shown with equal chance. Two such dice are rolled, what is the probability that the second one shows a larger number than the first one?

PrCl **2.2** Alice and Bob step in the lift on the ground floor of a 11-storey building. We assume that they both choose a floor 1 through 10 each with equal chance, independently of each other. What is the probability that Alice goes higher than Bob?

2.3 On a horse race of 7 horses, let S denote the event that *Star* is among the first three, and M the event that *Magic* has finished in an even position. Assuming each outcome to be equally likely, find the probability of $S \cap M$.

HW 2.4 Six people, named A, B, C, D, E, F sit in line randomly. What is the probability that exactly i people sit between A and B, $i = 0, 1, 2, 3, 4$?

2.5 Two fair dice have each two red faces, two green faces, one yellow and one white face. We roll this pair three times. What is the probability that they land on different colors in the first two rolls, then on the same color in the third roll?

2.6 An urn contains 3 red and 7 black balls. A and B alternate in drawing one ball at a time without replacement until the first time a red ball is drawn. If A makes the first draw, what is the probability that she is the first to draw a red ball?

2.7 We randomly place 8 rooks on the chessboard. What is the probability that no rook can attack another (that is, no column and no row contains more than one of them)?

HW 2.8 19 deer live in a forest, out of which 6 are tagged. Later on, 5 random deer of the 19 are captured. What is the probability that among those captured, 2 will be tagged? What assumptions are you making?

PrCl **2.9** 6 women and 6 men, a total of 12 people, are randomly divided into two groups of sizes 6 each. What is the probability that 3 women and 3 men will be in each of the two groups?

HW 2.10 Let E and F be two events with $\mathbf{P}\{E\} \geq 0.8$ and $\mathbf{P}\{F\} \geq 0.6$. Show that $\mathbf{P}\{E \cap F\} \geq 0.4$.

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[1]Details of how to hand in are to be discussed with your tutor.