MSAI Probability Home Assignment 1
deadline: 14/11/2022 23:59

As announced earlier, grading for HWs consists of points and bonus points. Solving bonus points (indicated with a star) problems is not required, but recommended. Also it will benefit your grade. Roughly you can expect maximum +2 to the grade if you solve bonus problems.

Problem 1. (2 points) If you randomly choose an answer to this question, what is the probability that this answer will be correct?

- 25%
- 50%
- 60%
- 25%

Give a number answer.

Problem 2. (3 points) A basket contains a white, b black and c red balls. We draw 3 balls wihtout replacement. What is the probability that:

- (1 point) All balls have different colours
- (1 point) Balls are drawn in the following order: white, black and red
- (1 point) Balls are drawn in the following order: red, black and white

Give a formula answer with derviation.

Problem 3. (3 points) A basket contains m balls, out of which m_1 are white and m_2 are black ($m_1 + m_2 = m$). We extract n balls from this basket **with replacement** and note their colors. Find the probability that out of these n balls exactly r were white. Give a formula answer with derviation.

Problem 4^* **.** (2 bonus points) The cloakroom of a theatre has randomly permuted all n visitors' hats. Find the probability that at least one visior gets his hat. Give the formula answer with derviation. Given $n = 4$, give a number answer. Hint: inclusion-exclusion.

Problem 5^* **.** (2 bonus points) 30 balls are arranged into 8 boxes. Find the probability of the following arrangement: 3 boxes are empty, 2 boxes have 3 balls, 2 boxes have 6 balls, one box has 12 balls. Give a number answer.