

INF5820, 2014, Arithmetic and probabilities, 3.9

Exercises on probability

If you are not familiar with probabilities, you are advised to do the exercises at

- http://www.statlect.com/probability_exercises.htm
 - Probability
 - Conditional probability
 - Bayes' rule
 - Independent events

Arithmetic

We will look on some mathematical notation including exponential s, logarithms, sums and products, to prepare for reading formulas like

$$c(\text{hund} \mid \text{dog}; \mathbf{e}_2, \mathbf{f}_2) = \frac{t(\text{hund} \mid \text{dog})}{\sum_{i=0}^3 t(\text{hund} \mid e_i)} \sum_{j=1}^3 \delta(\text{hund}, f_j) \sum_{i=0}^3 \delta(\text{dog}, e_i) = \frac{1/3}{\sum_{i=0}^3 (1/3)} \times 2 \times 2 = 1$$

and the formulas in chapter 4 in Koehn's book. If you are not familiar with such notation, you are advised to come. (We will fill these formulas with content later in the lectures, but it is a prerequisite that we can read the notation).

Probabilities

We will continue from last week and consider the arg-max-notation (e.g. formula 4.23 in Koehn's book) and binomial coefficients (used e.g. in formula 4.33).

Exercises

Exercise 1

We are rolling a dice four times.

- a) What is the chance of getting at least one six?
- b) What is the chance of getting exactly one six?
- c) Are the two events independent?
- d) What is the chance of the last dice being a five?
- e) What is the chance of having both (a) and (d)?
- f) Are (a) and (d) independent.

Exercise 2

We are interested in studying sentence length in text, i.e. to each sentence we observe its length.

- a) What is a reasonable sample space (utfallsrom) for this?
- b) Assume that A is the event corresponding to sentences at least 5 and less than 15 words long, and B correspond to sentences at least 10 but less than 20 words long. To what would $A \cap B$ correspond?
- c) Do you think A and B are independent? State reasons for your answer.