INF5830, 2017, Exercises on probabilities

Do the (solved) exercises from Statlect on

- Probability
- Conditional probability
- Bayes' rule
- Independent events

Exercise 1

Say we have a population with 4 numeric observations: {3, 5, 5, 11}

1. What is the median, mode and mean?
2. What is the variance and standard deviation?

Exercise 2 – Outcomes and sample spaces. ("utfall og utfallsrom")

We will conduct some simple experiments. You should try to define suitable sample spaces for the following:

1. Form a sequence of the words *Kari*, O*la*, *liker*, where each word occurs exactly once.
2. Form a sequence of the same three words where we allow repetitions.
3. Read a sentence and determine whether it contains a conjunction.
4. Read a sentence less than 100 words long and count the number of verbs.
5. Listen to a person speak and count how many words she utters before the first occurrence of the personal pronoun "I".

Exercise 3

Suppose that we know that a sentence chosen at random has a 0.3 probability of containing a conjunction and a 0.4 probability of containing a pronoun.

1. If we assume independence between containing a pronoun and a conjunction, what is the probability that a sentence contains both a pronoun and a conjunction?
2. And what is the probability it contains a pronoun but no conjunction?
3. It turns out that the probability for containing both a pronoun and a conjunction is 0.2. Are the two events independent.
4. What is the probability that a sentence which contains a pronoun also contains a conjunction?

Exercise 4

Consider the sample space of all English wordforms. We may define several stochastic variables from this sample space. One categoric stochastic variable is the part-of-speech or word class of the wordform with value space: {Noun, Verb, …}. One numeric stochastic variable is the number of characters in the wordform.

1. Define two other categoric stochastic variables and specify the value space for each of them
2. Define two other numeric random variables and specify their value space.

Exercise 5

Consider the space of all sequences of English words.

1. Define three different categoric stochastic variables on this space and specify their value space.
2. Define three different numeric random variables on this space.

Exercise 6

We are throwing 5 fair dices

1. What is the chance of getting 5 6s?
2. What is the chance of getting yatzy (five equal values, any value)?
3. What is the chance of getting at least 4 equals?
4. What is the chance of getting 4 – but not 5 – equals?
5. What is the chance of getting a house: 3 equals + a pair (with a different value)?

Exercise 7

We are considering the sum of the five fair dices.

1. What is the expectation of the sum?
2. What is the variance and the standard deviation of the sum?

The END