

Statistical investigation

In this assignment you are supposed to perform a statistical investigation. You will think about what you want to investigate, plan the experiment, collect data, and draw conclusions using the methods you have learned in the course.

1. Choose what you want to analyse and how the sample will be taken. Things to think about:
 - What is the population and what parameter do you want to make conclusions about?
 - the sample should consist of independent observations. How do you do the selection?
 - It should either be reasonable to assume the data to be normally distributed or the sample should be large enough (≥ 30).

Before proceeding, your plan must be approved by the teacher of the course.

2. Determine how the analysis will be carried out:
 - Consider what kind of conclusions you want to draw about the parameters. Do you have any guess for their values before collecting the data? In such case, you should do one hypothesis test, otherwise compute a confidence interval.
 - Choose the confidence level / significance level.
 - If the analysis relies on the assumption of normally distributed data, it should be checked that it is a reasonable one.
3. Collect the data. Note the cases where you get incorrect or missing answers/values.
4. Perform the analysis:
 - How do you think missing/erroneous data may affect the results?
 - Can you expect any deviation from the assumption of independence and the definition of population given in step 1? How do you think this affects the results?
5. Draw conclusions. Formulate your conclusions in two different ways, with different readers in mind
 - readers that can understand statistics;
 - readers without previous knowledge in statistics.

1 Guidelines

The most important thing about the assignment is to do it correctly, not to study one complicate question. Thus, we will expect a good report from you. It's better that you spend time on planning and preparation than doing a huge number of experiments/interviews.

Some things to keep in mind...

- You probably think of a particular population when you decide on a question. Ensure that the population from which you collect the sample is the right one. For example, if the question is "What proportion of chalmers student have driven to their first exam?", then make sure to ask only chalmers students and define what you mean by chalmers students.
- Make sure that the sample is representative of the population under study.
- Make sure to have enough sample to draw conclusions, describe how you have selected the individuals/experiments. Remember that the answers should be identically distributed (normal), and independent.
- If you make interviews: asks question that cannot be misinterpreted, affect the person interviewed in any way and double check the questionnaire before you collect the answers.
- Motivate if the measurement can be considered independent and identically distributed.
- Think of the method before doing the survey and think how to interpret the results. This could help you to detect errors in the design of the survey before it is done and ensure that the sample does not affect the results (which would lower the confidence level).
- Start writing the report directly and you can use it as a tool and support for the planning and during the investigation.

Report the report should contain

- questions you want to answer;
- methods used;
- population description and assumptions;
- collection description e.g. interview, survey,...;
- interpretation of the results;
- issues in the sample/study that may lead to incorrect conclusions/interpretations;