# Inference for categorical data - exercises

E. Pastucha

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Here are 5 exercises to solidify your knowledge about $\chi^2$ tests. For each exercise go slowly through the steps:

1. Decide on the test (testing for independence, goodness of fit)
2. Set up hypothesis.
3. Comment whether the data is fulfilling CLT conditions.
4. Conduct the test.
5. Form conclussions.

## 1. Study activity and progress

183 of 230 students that started on four of the engineering study programmes at SDU participated in the first math lecture. Of the students that participated in the first math lecture, 98 have completed their study while 85 have dropped out of the study. Similarly for the students that did not participate in the first math lecture, 14 completed their studies while 33 have dropped out of the study.

Conduct a $\chi^2$-test to see if there is a relation between participating in the first math lecture and passing the first year test. Use a significance level of 1%. Sketch your calculations.

## 2. Olive oil and heart attacks

An experimental study looked at the effect of changing the diet of people to see whether it was related to the number of heart attacks in the different groups. The three groups were the following:

- EVOO: A small potion of Extra Virgin Olive Oil was added to the dayly diet
- Nuts: A small potion of nuts was added to the daily diet
- Control: No changes in the daily diet.

The outcome of the study is shown below, with the number of participants and events (heart attacks) in each group.

| Condition | Participants | Events |
|---|---|---|
| EVOO | 2543 | 96 |
| Nuts | 2454 | 83 |
| Control | 2450 | 109 |

## 3. SDU Admissions in 2019

Dataset *admissions_sdu.csv* contains information about admisison numbers for undergraduate education at SDU in 2019. A 100 random admitted students were chosen for a survey to find out why they came to study at SDU. Chosen group included 72 students from Bachelors education, 10 from Engineering and 18 from Diploma Engineering. Conduct a $\chi^2$-test to check wheter it is a suitable representation of new students body (Start with calculation of proportions of places available for students within Bachelors, Engineering and Diploma Engineering educations).