Notes for Exercises in Session 8

- 9:39,36,38,48,**50**,52; x:**17**; 9:40,**20**,44 (9:**62**; final2013:1; **final2014:1**) — note suggested order!

Outline of lab session:

- Minitab software hints for two-way tables[1]: use menu

  `* Stat-Tables-Cross Tabulation and Chi Square`,

- summary worksheet for the lab review: S.11:2,
- home assignment II returned, with a brief review/discussion,
- individual work on the exercises.

Notes and questions for specific exercises:

- Don't forget the models and the conclusions! (two-way table analysis is more than computing the X^2-statistic!)
- 9.20: try Fisher's exact test (using software), and compare with the X^2-test,
- 9.36, 9.38: forget about the graphical displays,
- 9.44: on Simpson's paradox (might be fun!),
- x.17: practice of model choice in 2-way tables,
- final 2013.1, final 2014.1: exam problems involving non-parametric methods and statistical reporting, respectively (Rendle et al. (2007) paper at media page).

[1] Stata: `Stat-Summaries-Frequency Tables-Twoway table/Table calculator`; R functions: `xtabs`, `chisq.test`, `fisher.test`.

Home Assignment II

Main problem: *paired versus independent* samples,

- paired samples are not limited to multiple observations on the same subject (experimental unit),
- paired samples generally correspond to a block design where the pairs are blocks and the treatments are applied within blocks,
  - one way of thinking about pairs is that there should be less variation (in the outcome) within a pair than between pairs, before any treatments are applied,
  - another way of thinking is that pairs imply dependence among outcomes in a pair,
  - Question 6) was waived — see solution for discussion of what could be done from the data at hand,
- the specific design has two levels of matched pairs: between subjects (the two patients matched on age and duration of disease) and within subjects (the measurements before and after treatment),
- the pairing must naturally be used in the analysis, and it can lead to great loss of power not do so (e.g., comparing medicine and placebo groups as independent),
  - a surprisingly common mistake also in published papers: to "balance" treatment groups with respect to other variables, but then ignore those in the analysis.

Other issues:

- the improvements in medicine and placebo groups should be compared not just qualitatively, but also by statistical inference,
- alternative (and null) hypotheses should be decided before looking at the data, and one-sided alternative hypotheses should always be justified (two-sided being the default),
- a confidence interval for the mean does not give a range for individual values (see e.g. Exercises 6.33 and 6.5 (in Quiz 5)),
- (minor) it's the randomization and not the pairing that should lead to similar groups prior to treatment.

Assignment technique:

- please do answer the actual questions. . . ,
- I won't read answers off a Minitab listing, you have to bring them into the text, explicitly or by referring to them,
- same thing for the methods: they should be described and justified (some lenience was applied),
- if you are not sure what the questions mean, it's allowed to ask!