

# Homework 3

Statistics 411: Spring 2018  
Due: In class January 29

The following questions relate to the case study in section 1.1.2 of your text. You must report your answers to this problem in the format according to the Syllabus and *Writing a Statistical Report* available on the course website. The report, not including the Appendix that contains your R-code and R-output and figures and any tables, should not exceed two pages. Your grade will be determined by how well you answer the questions and by the organization and clarity of your write-up.

1. Load in the data for this problem. In R:

```
library(Sleuth3) # Install the Sleuth3 package from CRAN for this to work
sal = case0102
sal
```

2. Indicate the sampling plan and the experimental design.
3. Plot two histograms in the same plot similar to Display 1.4 and include in your report (see Chapter 1 notes for R code).
4. Apply a permutation test of the hypotheses that the mean salary differs by a gender (see Chapter 1 notes for R code). In the *Statistical procedures used*, perform the 6 steps of the hypothesis test including writing out  $H_0$  and  $H_a$ , checking the assumption that the permutation test is appropriate, and reporting the  $p$ -value. Also, give a CI for the difference in means. Put the R-code and R-output in the Appendix.
5. Apply a Welch two-sample  $t$ -test of the hypotheses that the mean salary differs by a gender using the `t.test()` function. Be sure to check the assumption that the  $t$ -test is appropriate. Report the  $p$ -value and a CI for the difference in means. Put the R-code and R-output in the Appendix.
6. Compare the results from the randomization test to the  $t$ -test. Are they similar? Did you expect the results to be similar? Why or why not? *It is common to analyze data using different statistical methods. If you get similar results, great! If not, then you need to figure out why the results are different and whether one, or all, of the methods are inappropriate for the data.*