

# Homework 3

STAT 625 Fall 2022

Due September 27, 2022, 12:30 pm

## 1 Reading

- Read Chapter 4 of the text.

## 2 Primary Questions:

Turn these in for your homework, or substitute some of the challenge questions below. If you do challenge questions make sure you do the same total number of parts as assigned, and that you do whole problems only.

\*hint\* several of these problems may be easier to write by hand. If you have a way to capture your writing electronically with another application, you may include imported graphics in your knitted file using syntax like:

```
““{r foo, out.width="100%", fig.cap="An example image."}
knitr::include_graphics("foo.pdf")
““
```

## 3 Primary Questions

1. Weisberg problem 3.1 (1 part)
2. Weisberg problem 3.2 (6 parts)
3. Weisberg problem 3.4 (4 parts)
4. You wish to test the one-sided alternative:  $AH : \beta_k > 0$  against the null hypothesis  $NH : \beta_k \leq 0$ . The statistical software you are using gives you a table with  $Pr(> |t|) = .08$  listed for this regressor. What is the p-value of your test? (1 part)
5. Briefly describe one applied situation in which you might want to use multiple regression. Specify the response (should be a continuous variable), and at least 2 regressors that would be of interest. What would you hope to learn from this regression?

In addition to the above questions, please select problems totaling 2 more parts from the following 2 sections

## 4 Strongly recommended for statistics and other more technical students

6. Using matrix differentiation, derive the formula for  $\hat{\beta}$  for multiple regression. (1 part)
7. Show that the estimates  $\hat{\beta}_0$  and  $\hat{\beta}_1$  for simple linear regression obtained in chapter 2 are the same as the values obtained with the matrix formulas in chapter 3. (1 part)

## 5 Recommended for more applied students

8. Weisberg problem 3.6 (2 parts)

## 6 Challenge questions:

9. Wesiberg problem 3.5 (3 parts)
10. Weisberg problem 3.7 (1 part)

## 7 Other

- Reading Reflection due 9/27 on Gradescope
- Project proposals due 10/4 on Gradescope - please think about if there is a project you would like to propose.

## 8 Pre-lecture Check

Complete this week's timed pre-lecture check on **gradescope**.