

# Homework 2

STAT 625 Fall 2022

Due September 20, 2022, 12:30pm

## 1 Reading

- Read Chapter 3 of the text.

## 2 Primary Questions:

Turn these in for your homework, or substitute some of the challenge questions below.

\*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")
““
```

1. Weisberg problem 2.2 (4 parts)
2. Weisberg problem 2.3 (2 parts)
3. Wesiberg problem 2.9 (2 parts)
4. Weisberg problem 2.15 (2 parts)
5. Weisberg problem 2.16 (6 parts)
6. Suppose I have fitted a simple linear regression model. For a new  $x$  value,  $x_*$ , which is wider: a prediction interval for new value  $y_*$  or a confidence interval for  $E(y_*|x_*)$ ? Why? (1 part)

In addition to the above questions, please select problems totaling 7 more parts from the following 2 sections

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

7. Weisberg problem 2.10 (6 parts) \*Note: for the last part, you need only replicate the two t-tests. You may want to use the R function `t.test` as well as the test using `lm()`.
8. Using differentiation, derive the formulas for  $\hat{\beta}_0$  and  $\hat{\beta}_1$  as ordinary least squares estimators. (1 part)

## 4 Recommended for more applied students

9. Weisberg problem 2.13 (3 parts)
10. Weisberg problem 2.4 (3 parts)
11. Weisberg problem 2.5 (1 part) You may use the R function `t.test` or test using `lm()`

## 5 Challenge questions:

Use any of these whole problems to substitute for above so that the total number of parts completed is the same.

- 12. Weisberg problem 2.11 (2 parts)
- 13. Weisberg problem 2.14 (3 parts) (hint: in part b, use compute the prediction errors directly. in part c, use the formula in the book as illustrated in the companion primer)
- 14. Weisberg problem 2.17 (3 parts)

## 6 Pre-lecture Check

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