

Statistics 411/511

Homework 5

Due Tuesday, November 2 by midnight

- **Instructions:** Please see the end of the [syllabus](#) for guidelines. Upload your homework to Gradescope via Canvas (access specific homework assignments from the “Assignments” link at the left of the Canvas course page). Your file must be a pdf document. **There will be a one-point deduction if you don’t assign pages** (see [this Gradescope help video](#)).
- Do the computational part of the homework shortly after completing the week’s lab activity.
- The problems are assigned from the **third edition** of the textbook. If you have another edition, consult the [copy on one-hour reserve at the library website](#) for the homework problems.
- **Academic Integrity** You are encouraged to *discuss* the homework with other students, but what you turn in must be your own work in your own words. **DO NOT** copy someone else’s homework. You may share ideas and R code, but do not share R output or written language. The syllabus contains details and links to OSU’s Student Conduct Code and procedure for reporting suspected academic misconduct.

1. Download the file legs.csv from [Files>Homework](#) on the course Canvas site. Read the data into RStudio (see the procedure in item 7 of Lab 2).

This file contains data on weights of chicken legs. Researchers selected a random sample of 120 chickens from a large poultry farm. The 120 chickens were randomly assigned to four groups. Each group received one of four diets. After 12 weeks, the average weight of each chicken’s legs was recorded in grams. During the 12-week study, six chickens were lost, so the total sample size is only 114.

The data file contains two variables:

- Diet: either BC, BCM, BS, or BSM
 - Weight: the average weight in grams of the chicken’s two legs
- (a) Make side-by-side boxplots of weight for the four diet groups. Include your R code and graph.
 - (b) The ANOVA F -test is an extension of the two-sample t -test when there are more than two samples. The ANOVA F -test has the same three assumptions as the two-sample t -test. State each assumption and whether it is reasonable for the cotton data. Give a brief justification for each answer.
 - (c) State the null and alternative hypotheses to answer the research question, “does population mean leg weight vary among the four diets?” Your hypotheses should be in terms of population parameters. Define any notation you use for the population parameters.
 - (d) Perform a one-way ANOVA to test your null hypothesis in (c). Include R code and output.
 - (e) Write a statistical conclusion to report the results of your hypothesis test in part (d).
 - (f) Calculate a 95% confidence interval for the difference between the population mean leg weight for the chickens fed the BS vs BSM diet. Submit R code and output.

(Problem 1 continued on next page)

- (g) Write a statistical conclusion for your confidence interval in (f)
- (h) See pages 4 and 5 of Outline 1 where we first saw the idea of a scope of inference. Write a “scope of inference” for your conclusions in parts (e) and (g).