Statistics 411/511
Homework 8 (last one!)
Due Tuesday, November 30 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.

For this homework, use the black wheatear data, described in Exercise 27 of Chapter 7. This is `ex0727` in the `Sleuth3` R package.

1. Produce a scatterplot of T-cell response vs. mean stone mass with fitted regression line and confidence band. Include R code and the plot. Does the linearity assumption appear to be met?

   Note: It's customary to give the response variable first: a scatterplot of Y vs. X.

2. Estimate the regression of T-cell response on mean stone mass. Give the estimated regression equation with standard errors of the coefficients below the coefficients in parentheses, as at the bottom of page 187 in the *Sleuth* or as we did on page 9 of Outline 7 when we discussed it in lecture on November 17. Please include R code but not output.

3. Calculate 95% confidence intervals for the intercept and slope parameters of the regression equation. State the two intervals. Indicate which estimates the slope parameter and which estimates the intercept parameter. Statistical conclusions are not necessary for this question. Please include your R code but not output.

4. On page 10 of Outine 7, we interpreted β_0 as the population mean pH when log(Time)$= 0$. What is the interpretation of β_0 in our simple linear regression model for the black wheatear data?

5. Calculate a 95% confidence interval for the population mean T-cell response for male black wheateaters who transport stones averaging 5 grams. Include R code and output, and write a statistical conclusion reporting this interval.

6. Calculate a 95% prediction interval for T-cell response for male black wheateaters who transport stones averaging 6 grams. Include R code and output, and write a statistical conclusion reporting this interval.