Statistics 411/511
Homework 8
Due in Lab Monday and Tuesday, November 21 and 22

- **Homework Guidelines** Homework must be typed and stapled. Please label your paper with your name and lab time. See the syllabus for more guidelines.

- **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. The syllabus contains more details and links to OSU's Student Conduct Code.

Download the file streams.csv from Files>Homework on the Canvas course website. These data are from W.J. Kleindl's 1995 University of Washington master's thesis titled, *A benthic index of biotic integrity for Puget Sound lowland streams*. The data are measurements on 17 streams and include two columns labeled *Area* and *BIBI*. Area refers to the percentage of stream watershed total area that is impervious, and this measurement is a proxy for the amount of urbanization. BIBI is an index of the stream's biotic integrity and measures what Kleindl describes as "the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition and functional organization comparable to that of natural habitat in the region."

From Kleindl's thesis: "Nineteen streams were selected to examine the effects of urbanization on the biotic integrity of the Puget Sound Lowlands. The nineteen streams represented a range of land use conditions in King, Kitsap, Snohomish, and Thurston counties..."

1. Read the stream data into R (see Lab 3, item 5(b) for code). Produce a plot similar to that of Display 7.11 on page 191 of the textbook. Your plot should show a scatterplot of the data with Area as the independent variable and BIBI as the dependent variable, a fitted regression line, a 95% confidence band for a single mean, and 95% prediction limits for a an unknown area. Please include R code but not output (other than the plot).

2. Give the estimated regression equation with standard errors of the coefficients in parentheses, as at the bottom of page 187 in the *Sleuth*. Please include R code, but not output.

3. Calculate a 95% confidence interval for the intercept parameter β_0, and give a statistical conclusion reporting this interval. Please include R code, but not output.

4. Compose a "scope of inference" statement regarding this study. Mention the sampled population and whether, to the best of your knowledge, the sample was randomly selected.