

Homework 1, due 21 Sep

1. Question 2.3. Table B.2 presents data collected during a solar energy project at Georgia Tech.
 - a. Fit a simple linear regression model relating total heat flux y (kilowatts) to the radial deflection of the deflected rays x_4 (milliradians).
 - b. Construct the analysis-of-variance table and test for significance of regression.
 - c. Find a 99% CI on the slope.
 - d. Calculate R^2 .
 - e. Find a 95% CI on the mean heat flux when the radial deflection is 16.5 milliradians.
2. Question 2.6. Table B.4 presents data for 27 houses sold in Erie, Pennsylvania.
 - a. Fit a simple linear regression model relating selling price of the house to the current taxes (x_1).
 - b. Test for significance of regression.
 - c. What percent of the total variability in selling price is explained by this model?
 - d. Find a 95% CI on β_1 .
 - e. Find a 95% CI on the mean selling price of a house for which the current taxes are \$750.
3. Question 2.7. The purity of oxygen produced by a fractional distillation process is thought to be related to the percentage of hydrocarbons in the main condenser of the processing unit. Twenty samples are shown below.
 - a. Fit a simple linear regression model to the data.
 - b. Test the hypothesis $H_0 : \beta_1 = 0$.
 - c. Calculate R^2 .
 - d. Find a 95% CI on the slope.
 - e. Find a 95% CI on the mean purity when the hydrocarbon percentage is 1.00.
4. Question 2.8. 2.8 Consider the oxygen plant data in Problem 2.7 and assume that purity and hydrocarbon percentage are jointly normally distributed random variables.
 - a. What is the correlation between oxygen purity and hydrocarbon percentage?
 - b. Test the hypothesis that $\rho = 0$.
 - c. Construct a 95% CI for ρ .