

## Stat 104 – Homework 3

### Due Thursday September 24, 2009

**Reading:**       September 8 – September 17   Chapter 3  
                   September 22 – September 29   Chapter 4

**Assignment:**

1. Complete the following problems from the text: 3.1, 3.5, 3.9, 3.11, 3.16, 3.27, 3.28, 3.33, and 3.47.
2. The December 2003 issue of Kiplinger’s Personal Finance published data on the 2004 model year cars and light trucks (vehicles). A random sample of 10 vehicles was taken from the data published. Below are the names of the vehicles, the EPA city mileage (mpg) ratings and the weights (tons).

Vehicle name	Ford Focus	Chevy Malibu	Ford Taurus	Kia Optima	Nissan Altima	Toyota Camry	Mitsubishi Diamante	VW Jetta	Lexus ES	Cadillac Deville
Weight, $x$	1.30	1.59	1.65	1.64	1.52	1.54	1.77	1.59	1.73	1.99
City mpg, $y$	26	24	20	20	21	24	18	21	20	18

- a) Plot the data. Use Weight as the explanatory variable,  $x$ , and City mpg as the response,  $y$ . Describe the relationship between Weight and City mpg.
  - b) Compute the mean and standard deviation for the Weight. Round final answers to 3 decimal places.
  - c) Compute the mean and standard deviation for the City mpg. Round final answers to 3 decimal places.
  - d) Using  $\sum(x - \bar{x})(y - \bar{y}) = -3.674$ , show that the correlation between Weight and City mpg is  $r = -0.853$ . Explain in words what this correlation means.
  - e) Compute the estimate of the slope for the least squares regression line. Round final answer to 2 decimal places.
  - f) Give an interpretation of the estimated slope within the context of the problem.
  - g) Compute the estimate of the intercept for the least squares regression line. Round final answer to 2 decimal places.
  - h) Give the equation of the least squares regression line. Use this equation to predict the City mpg for the Taurus that weighs 1.65 tons. Give the residual for the Taurus.
3. Data were collected on the selling price of homes (\$100) and the living area of the home (ft<sup>2</sup>) for a sample of 50 homes. The data are available by following the link to ([all](#)) sections of Stat 104 from [www.stat.iastate.edu/courses/](http://www.stat.iastate.edu/courses/). Follow the instructions in the JMP Guide to download/open the data set. Use JMP to look at the distribution of selling price and the relationship between living area and selling price. Use the JMP output to help you answer the questions below. Be sure to attach the JMP output to your assignment.
    - a. Describe the distribution of selling price of homes. Make sure to include in your description the five number summary, the mean and standard deviation, and the shape of the histogram. Are there any outliers? If so, what are the selling prices?
    - b. Describe the scatter plot of selling price of homes versus living area. Give the regression equation for predicting the selling price of homes from living area. Give an interpretation of the estimated slope. Give the value of  $R^2$  and an interpretation of this value. Finally, describe the plot of residuals versus living area and make note of any potential problems with the regression.