

Math 15
Homework Assignment

Read sections 13.7 – 13.10

1. The article “Crop Improvement for Tropical and Subtropical Australia: Designing Plants for Difficult Climates” (Field Crops Research, 1991) gave the accompanying data on x = crop duration in days for soybeans and y = crop yield in tons/hectare.

x	92	92	96	100	102	102	106	106	121	143
y	1.7	2.3	1.9	2.0	1.5	1.7	1.6	1.8	1.0	0.3

- Draw a scatterplot of the raw data and a residual plot. Give interpretations of both.
- Conduct a hypothesis test for β . Give the p-value and statement about whether the linear relationship is statistically significant.
- Identify any outliers and describe the effect they may have on the analysis.
- Give an explanation of the coefficient of determination.
- Give a 95% prediction interval estimate for the crop yield corresponding to a crop duration of 105 days.

2. The PJH&D Company is in the process of deciding whether to purchase a maintenance contract for its new word-processing system. The company feels that maintenance expense should be related to usage, and it has collected the following information on weekly usage (hours) and annual maintenance expense:

Observation #	1	2	3	4	5	6	7	8	9	10
x = Weekly Usage (hours)	13	10	20	28	32	17	24	31	40	38
y = Annual Maintenance Expense (in \$100s)	17	22	30	37	47	30.5	32.5	39	51.5	40

- Sketch the scatterplot for regressing y on x . Be sure to label your axes and circle on your plot Observation #4.
- Find the equation of the least squares regression line for regression y on x .
- Draw (or superimpose) the regression line in part (b) on the scatterplot in part (a).
- Suppose that the weekly usage for a company is 21 hours. Predict their annual maintenance expense. Show your work and include your units.
- Using the new word-processing system incurs other expenses besides maintenance costs. Suppose that weekly utility costs, C , in dollars, is related to weekly usage by the following equation: $C = 3X - 0.80$. What would be the correlation between weekly utility cost, C , and annual maintenance cost, Y ?
- Sketch the residual plot on the basis of this regression analysis. Be sure to label your axes and circle on your plot the residual for Observation #4.
- Based on the residual plot, does the linear model seem appropriate? Explain.