

GSE Math Camp
Lecture 5 HW

1. The average August temperatures (y) and geographic latitudes (x) of 20 cities in the United States were gathered. The regression equation for that data is:

$$\text{Temperature} = 113.6 - 1.01(\text{Latitude})$$

- a. What is the slope of the line? Interpret the slope in the context of the problem.
 - b. Estimate the mean August temperature for a city with a latitude of 32.
 - c. San Francisco has a mean August temperature of 64 and its latitude is 38. Use the regression equation to estimate the mean August temperature in San Francisco, and then calculate the prediction error (residual) for San Francisco.
 - d. Why should we not use this regression equation to estimate the mean August temperature at the equator? (latitude=0)
2. Highway planners investigated the relationship between traffic density (number of automobiles per mile) and the average speed of the traffic on a moderately large city thoroughfare. The data were collected at the same location at 10 different times over a span of 3 months. They found a mean traffic density of 68.6 cars per mile (CPM) with standard deviation of 27.07 cpm. Overall, the cars' average speed was 26.38 mph with standard deviation of 9.68 mph. These researches found the correlation between speed and density to be -0.984
 - a. Identify the explanatory and response variables for this situation.
 - b. Using the information given, what is the equation of the regression line? Show your work!
 - c. Interpret the coefficient of determination (R^2) in the context of this problem.

3.

Dependent variable is: fare

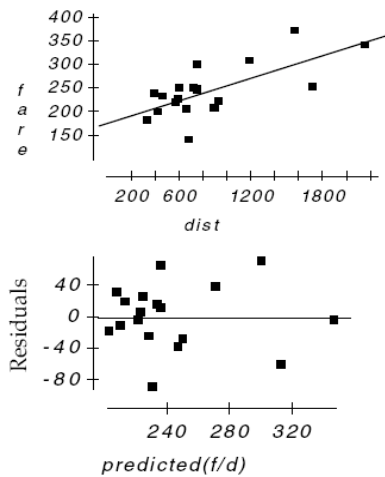
No Selector

R squared = 48.2% R squared (adjusted) = 45.0%

s = 41.82 with 18 - 2 = 16 degrees of freedom

Source	Sum of Squares	df	Mean Square	F-ratio
Regression	26037.4	1	26037.4	14.9
Residual	27980.6	16	1748.79	

Variable	Coefficient	s.e. of Coeff	t-ratio	prob
Constant	177.215	19.99	8.86	≤ 0.0001
dist	0.078619	0.0204	3.86	0.0014



- Describe the relationship from the scatterplot.
- What is the correlation coefficient? Interpret this value.
- Explain what R^2 means in this context.
- Write the equation of the model. (Remember to put it in context!)
- Explain what the slope means in context.
- Explain what the y-intercept means in context.
- Predict the airfare for a 1000-mile flight.
- The fare to fly to New York, 1358 miles from Tulsa, is \$455. Find the residual for this point.