

Homework 1

1. New York City Open Accessible Space information System Cooperative (OASIS) is an organization of public and private sector representatives that has developed an information system designed to enhance the stewardship of open space.²² Data from the OASIS Web site for 12 large U.S. cities follow. The variables are population in thousands and open total park or open space within city limits in acres.

City	Population	Open space
Baltimore	651	5091
Boston	589	4865
Chicago	2896	11645
Long Beach	462	2887
Los Angeles	3695	2887
Miami	362	1329
Minneapolis	383	5694
New York	8008	49854
Oakland	399	3712
Philadelphia	1518	10685
San Francisco	777	5916
Washington, D.C.	572	7504

- a) Make a scatterplot of the data using population as the explanatory variable and open space as the response variable.
- b) Is it reasonable to fit a straight line to these data? Explain your answer.
- c) Find the least squares regression line. Report the equation of the line and draw the line on your scatterplot.
- d) What proportion of the variation in open space is explained by population?

2. The regression equation. The equation of a least-squares regression line is $y = 12 + 6x$.

- (a) What is the value of y for $x = 5$?
- (b) If x increases by one unit, what is the corresponding increase in y ?
- (c) What is the intercept for this equation?

3. Progress in math scores. Every few years, the National Assessment of the Educational Progress asks a national sample of the eighth-graders to perform the same math tasks. The goal is to get an honest picture of progress in math. Here are the last few national mean scores, on a scale of 0 to 500:24

Year	1990	1992	1996	2000	2003	2005	2008
Score	263	268	272	273	278	279	281

- (a) Make a time plot of the mean scores, by hand. This is just the scatterplot of the score against year. There is a slow linear increasing trend.
- (b) Find the regression line of the mean score on the time step-by-step. First calculate the mean and standard deviation of each variable and their correlation (use a calculator with these functions). Then find the equation of the least-squares line from these. Draw the line on your scatterplot. What percent of the year-to-year variation in scores is explained by the linear trend?
- (c) Now use software or the regression function on your calculator to verify your regression line.
4. Metabolic rate and lean body mass. Compute the mean and the standard deviation of the metabolic rates and lean body masses data given below. Use these values to find the slope of the regression line of metabolic rate on lean body mass. Also find the slope of the regression line of the lean body mass on metabolic rate. What are the units for each of the two slopes?