Chapter Three: Examining Relationships

Construct and interpret a scatterplot for a set of bivariate data.

Compute and interpret the correlation *r* between two variables.

Demonstrate an understanding of the basic properties of the correlation *r*.

Explain the meaning of a *least squares regression line*.

Given a bivariate data set, construct and interpret a regression line.

Demonstrate an understanding of how one measures the quality of a regression line as a model for bivariate data.

Section 3.1: Scatterplots and Correlation

Explain the difference between an *explanatory variable* and a *response variable*.

Given a set of bivariate data, construct a *scatterplot*.

Explain what is meant by the *direction*, *form*, and *strength* of the overall pattern of a scatterplot.

Explain how to recognize an *outlier* in a scatterplot.

Explain what it means for two variables to be *positively* or *negatively associated*.

Explain how to add *categorical variables* to a scatterplot.

Use a graphing calculator to construct a scatterplot. {Construct a scatterplot by hand.} {Construct a scatterplot using computer software.}

Define the correlation *r* and describe what it measures.

Given a set of bivariate data, use technology to compute the correlation *r*. {Manually compute r for a small data set.}

List the four basic properties of the correlation *r* that you need to know to interpret any correlation.

List four other facts about correlation that must be kept in mind when using *r*.

Section 3.2: Least-Squares Regression

Explain what is meant by a *regression line*.

Given a regression equation, interpret the *slope* and *y-intercept* in context.

Explain what is meant by *extrapolation*.

Explain why the regression line is called the *"least-squares regression line"* (LSRL)

Explain how the coefficients of the regression equation, $\hat{y} = a + bx$, can be found given *r*, s_x, s_y, and $(\bar{x}, \bar{y})$.

Given a bivariate data set, use technology to construct a least-squares regression line. {Manually construct a least-squares regression line for a small data set.}

Define a *residual*.

Given a bivariate data set, use technology to construct a *residual plot* for a linear regression.

List two things to consider about a residual plot when checking to see if a straight line is a good model for a bivariate data set.

Explain what is meant by the *standard deviation of the residuals*.

Define the *coefficient of determination,* r^2, and explain how it is used in determining how well a linear model fits a bivariate set of data.

List and explain four important facts about least-squares regression.

Section 3.3: Correlation and Regression Wisdom

Recall the three limitations on the use of correlation and regression.

Explain what is meant by an *outlier* in bivariate data.

Explain what is meant by an *influential* observation and how it relates to regression.

Given a scatterplot in a regression setting, identify outliers and influential observations.

Define a *lurking variable*.

Give an example of what it means to say *"association does not imply causation."*

Explain how correlations based on averages differ from correlations based on individuals.