

Chapter 3: Examining Relationships



Key Vocabulary:

- response variable
- explanatory variable
- independent variable
- dependent variable
- scatterplot
- positive association
- negative association
- linear
- correlation
- r-value
- regression line
- mathematical model
- least-squares regression line
- \hat{y} "y-hat"
- SSM
- SSE
- r^2
- coefficient of determination
- residuals
- residual plot
- influential observation

Calculator Skills:



- seq(X,X,min,max,scl)
- $\bar{x}, s_x, \bar{y}, s_y$
- 2-Var Stats
- Clear All Lists
- sum
- residual plot
- Diagnostic On

3.1 Scatterplots and Correlation (pp.171-199)

1. What is the difference between a *response variable* and an *explanatory variable*?
2. How are response and explanatory variables related to *dependent* and *independent* variables?
3. When is it appropriate to use a *scatterplot* to display data?
4. Which variable always appears on the horizontal axis of a scatterplot?
5. You can describe the overall pattern of a scatterplot by the...

6. Explain the difference between a *positive association* and a *negative association*.
7. How can quantitative data which belongs to different categories be differentiated on a scatterplot?
8. What does *correlation* measure?
9. Explain why two variables must both be *quantitative* in order to find the *correlation* between them.
10. What is true about the relationship between two variables if the *r-value* is:
 - a. Near 0?
 - b. Near 1?
 - c. Near -1?
 - d. Exactly 1?
 - e. Exactly -1?
11. Is *correlation* resistant to extreme observations? Explain.
12. What does it mean if two variables have *high correlation*?
13. What does it mean if two variables have *weak correlation*?
14. What does it mean if two variables have *no correlation*?

3.2 Least-Squares Regression (pp.199-233)

1. In what way is a *regression line* a *mathematical model*?
2. What is *extrapolation* and why is this dangerous?
3. What is a *least-squares regression line*?
4. What is the formula for the equation of the *least-squares regression line*?
5. The *least-squares regression line* always passes through the point ...
6. What is a *residual*?
7. How can you calculate *residuals* on your calculator and use this to produce a *residual plot*?
8. If a *least-squares regression line* fits the data well, what characteristics should the *residual plot* exhibit?
9. How is the *coefficient of determination* defined?
10. What is the formula for calculating the *coefficient of determination*?
11. If $r^2 = 0.95$, what can be concluded about the relationship between x and y ?

3.3 Correlation and Regression Wisdom (pp.233-251)

1. What are three limitations of correlation and regression?
2. Under what conditions does an outlier become an *influential observation*?
3. What is a *lurking variable*?
4. Why does *association* not imply *causation*?

