Reading Assignments: Sections 4.3 – 4.4

- Make sure you complete the homework on the previous sections before you begin your reading.
- Review page 147, Equation of a Line as studied in basic algebra.

Section 4.3 Modeling Linear Trends

Learning Objectives:
- Understand how to use a regression line to summarize a linear association between two numerical variables.
- Know how to differentiate between the explanatory and response variable, order matters when choosing which variable to represent “x” and “y”.
- Be able to interpret the slope and the intercept of the regression line.
- Know how to use the regression line to predict the mean value of the response variable.

Key Point

- When the trend is linear, the regression line also called the least square regression line connects the points that represent the mean value of y for each value of x. In other words then line is chosen so that the sum of the squares of the differences between the observed y-value, y and the predicted y-value, \( \hat{y} \) is as small as possible. (see figure 4.17 on page 150 for clarification)

Read pages 146 – 160. As you read:
- Complete “Try This” exercise 4.21 on page 149
- Use the applet on page 149, this should give you a feel for placing a regression line also known as a “best fit” or “least square” regression line by sight.
- Try example 4 on page 150 using Stat Crunch.
- Complete “Try This” exercises 4.23 and 4.27 on pages 152 and 153.
- Watch the AS video, Learn About Interpreting Equations” on page 153.
- Watch AS video, Learn About Scatterplot Axes” on page 154.
- Complete “Try This” exercise 4.25 on page 155.
- Watch the AS video, Predict the Manatee Kills Using Least Square Regression on page 157.
- Complete “Try This” exercise 4.37 on page 158.
- At the conclusion of this section you should be able to explain the following concepts about the slope and the intercept:
  - What is it?
  - What does it do?
  - How does it do it?
  - How is it used?

Section 4.4 Evaluating the Linear Model

Learning Objectives:
- Be able to determine how “good” is the best fit line.
- Be able to critically evaluate a regression model.
  - Don’t extrapolate
  - Don’t make cause-and-effect conclusions if the data are observational.
- Beware of outliers, which may or may not strongly affect the regression line
- Proceed with caution when dealing with aggregated data

**Key Point**

- An association between two variables is NOT sufficient evidence to conclude that a cause-and-effect relationship exists between the variables, no matter how strong the correlation.

Read Pages 161 – 167. As you read;

- Watch the AS video, Learn How Correlation and Regression are Related on page 165
- Understand how the coefficient of determination, \( r^2 \) measures “goodness” of fit
  - Know what it is.
  - What does it do?
  - How does it do it?
  - How is it used?