Name:_____ Date:_____ Period:_____

Chapter 11 Investigation Guide

Before you begin the written report:

1.) Choose an athlete team or league that you are interested in investigating. The purpose of this investigation is to determine which of the two explanatory variables has a stronger relationship with a response variable.

2.) Choose a single response variable that you want to make predictions about and two different explanatory variables that you can use to make the predictions. For example. to predict the number of wins in the NBA (response variable), you could use the number of points scored and the number of points allowed, (explanatory variables) for all NBA teams during a season. Or, to predict the number of points scored by an NFL team (response variable), you could use the number of passing yards and the number of rushing yards (explanatory variables) for all of the team's games in one season.

3.) Find the relevant data on the internet or another source. Do not include playoff games, as these are played in different circumstances as regular season games.

To complete the written report:

1.) Write an introduction which states the question of interest and briefly describes the context of the athlete, team, or league's performances. Describe how and where you obtained your data and include the raw data for all these variables.

2.) Create a scatterplot to show the relationship between the first explanatory variable and the response variable. Briefly describe the association. Calculate the equation of the least-squares regression line and standard deviation of the residuals. Interpret the slope and the standard deviation of the residuals in context.

3.) Repeat step #2 for the second explanatory variable

4.) Give a preliminary answer to the question of interest based on the scatterplots and standard deviation of the residuals.

5.) Using the relationship with the smaller standard deviation of the residuals, state the hypotheses you will test to determine if there is a statistically significant association between the two variables. Identify and calculate the value of the test statistic you will use to test the hypotheses.

6.) Describe how to use note cards to simulate the distribution of the test statistic. Then, by hand or using the statistical applet, conduct at least 100 trials of a simulation to see what values of the test statistic could happen by random chance, assuming that the null hypothesis is true. Include a well-labeled dotplot to display the results of the simulation.

7.) Use the results of the simulation to estimate and interpret the p-value. Then, make an appropriate conclusion about the hypotheses based on the p-value.

8.) Discuss any limitations or possible errors you may have made in your conclusion. Can you conclude that there is a cause-and-effect relationship between the two variables?

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Chapter 11 Investigation Guide: Checklist

- ☐ Title Page
- ☐ Table of Contents
- ☐ Introduction
  - What is the question of interest
  - Introduce the performance and context of the investigation
  - Give preliminary answers to the questions of interest
  - State your hypotheses
- ☐ Raw Data Collection
  - Lists the raw data in an organized table for both variables (see page 416)
- ☐ Scatterplots
  - A scatterplot to show the relationship between the explanatory and response variable
    - 2 total
  - Describe the association
  - Insert a least-squares regression line into both scatterplots
    - Include the equation of the least squares regression line
    - Interpret the slope of the least-squares regression line
- ☐ Standard Deviation of the Residuals
  - Calculate the SD of the residuals
    - Interpret this value
  - Decide which SD you will use for the simulation and explain why you selected that value.
  - Identify what you will use for the test statistic to test the hypotheses
- ☐ Simulation
  - Explain the notecard simulation
  - Use the applet to conduct at least 100 trials of the simulation
  - Create a dotplot to display the results
  - Estimate and interpret your p-value
- ☐ Conclusion
  - Give a final conclusion based on the results of your simulation
  - Summarize the investigation as a whole
- ☐ Errors/Causes
  - List any possible errors you may have made
  - Which type of error did you make, type I or 2
- ☐ References
  - Use MLA formatting