Chapter 7 Investigation Guide

Before you begin the written report,

1. Choose an athlete or team that you can compare in two different contexts or choose two different athletes or teams that you can compare to each other. Remember that the purpose of this investigation is to compare consistency!
2. Choose a single *numerical* variable that you will use to measure the consistency of the athlete(s) or team(s) that you chose in step 1.
3. Find the relevant data on the internet or another source. Many of the websites listed below allow you to copy and paste the data into a spreadsheet program such as Excel. To see the game-by-game results, click on a link that says something like "Game Log" or "Schedule and Results." Do not include playoff games in the data, as these games are played in different circumstances than 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 or team's *PERFORMANCES*, including noteworthy accomplishments that year and why you chose to use a particular variable to measure consistency. Describe how and where you obtained your data *and* include the null and alternative hypotheses.
2. Include the raw data from both contexts and make appropriate graphs to compare the athlete or team's *PERFORMANCES*. *Do not use Excel to make your graphs!* Compare the graphs in detail and include appropriate summary statistics. Give a preliminary answer to the question of interest.
3. Identify and calculate the value of the test statistic you will use to test the hypotheses.
4. Describe how to use note cards to simulate the distribution of the test statistic. Then, by hand or using the applet, conduct at least 50 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.
5. 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.
6. Discuss any limitations or possible errors you may have made in your conclusion. If there is convincing evidence of a difference in consistency, discuss possible causes.

Web sites with data for multiple sports include:

- www.sports-reference.com
- www.espn.com
- www.usatoday.com/sports
- sports.yahoo.com
- www.si.com

Web site for applet:

- www.whfreeman.com/SRIS

Rubric for Chapter 7 Investigation	4 = Complete	3 = Substantial	2 = Developing	1 = Minimal
Introduction and Data Collection	• Describes the context of the research (sport, player, team, year, etc.) and includes reasons for variable choice • Has a clearly stated question of interest, including formal hypotheses • Specifically describes how the data was collected (including source) • Uses appropriate data to answer the question of interest *and* includes raw data	• Has a specific question of interest and includes raw data, but doesn't adequately introduce the context, describe how the data was collected, or state correct hypotheses	• Has a question of interest and uses appropriate data, but has several other problems	• Has a question of interest
Graphs and Summary Statistics	• Includes appropriate types of graphs for raw data • Graphs are clearly labeled and easy to compare • Graphs are discussed/compared correctly • Appropriate summary statistics are calculated and discussed	• Appropriate graphs and summary statistics are included, but graphs are not well done, graphs are not compared, or summary statistics are not discussed	• Includes appropriate graphs and summary statistics, but there are several problems (e.g. graphs or statistics are incorrect or have other major problems)	• Some graphs are included or some summary statistics are calculated
Analysis/ Simulation	• Test statistic is clearly identified and correctly calculated • Clearly describes method for performing a simulation and includes an adequate number of trials • Displays results of simulation in a clear, well labeled dotplot • Estimates *p*-value correctly	• Conducts a reasonable simulation/calculation to estimate the *p*-value, but there is a small error, the method is not clearly described, or the test statistic is not clearly identified or calculated	• Attempts a simulation/ calculation to estimate *p*-value	• Attempts to analyze the data
Conclusions	• Correctly interprets *p*-value in context • Correctly uses the results of the simulation to draw an appropriate conclusion about the question of interest • Shows evidence of critical reflection (discusses possible errors, shortcomings, limitations, alternate explanations, etc.)	• Makes the correct conclusion based on simulation/*p*-value • Shows some evidence of critical reflection	• Makes a partially correct conclusion based on simulation/*p*-value (e.g. accepts null) • Little evidence of critical reflection	• Makes a conclusion
Overall Presentation/ Communication	• Clear, holistic picture of the investigation as a two-step process (e.g., includes preliminary and final conclusions) • Investigation is well organized, neat and easy to read • Ideas are well communicated, including appropriate transitions between sections • Clearly contrasts the concepts of *true* SD and *observed* SD in context	• Investigation is organized, easy to read, and has appropriate transitions, but lacks clear communication, a holistic picture of the investigation, or does not clearly contrast the concepts of *true* SD and *observed* SD in context	• Investigation is somewhat organized, but has several major problems	• Communication and organization are poor