

Signature Statistics Inquiry

The purpose of the Statistics Inquiry assignment is to deepen the following skills:

- Critical Thinking Skills - to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.
- Communication Skills - to include effective development, interpretation and expression of ideas through written, oral and visual communication.
- Empirical and Quantitative Skills - to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

The Statistics Inquiry assignment provides students with two statistical summary opportunities. The **first part involves descriptive statistics**, for which you will evaluate, analyze, and display summaries of a data set that you choose from a provided list. The **second part involves inferential statistics**, whereby you will use the data to formulate and test hypotheses. You will submit a written report to communicate your findings and conclusions in Blackboard.

The written report must be completed and uploaded as a Microsoft Word document into the Blackboard assignment, "Statistics Inquiry and Analysis," which utilizes SafeAssign. Any graphs or displays should be included in your word document.

BONUS OPPORTUNITY (5 points): Instead of choosing a data set from our list, develop your own topic and collect your own data! Complete Parts I and II with your own data for bonus points. You will need to show how you collected your data and include the raw data you collected as an appendix.

Part I: Descriptive Statistics

Describe the data you chose by explaining what variable or variables you are summarizing/displaying and why you chose the variable(s). Include in your description your reasons for how you decided to summarize and/or display your data in the way in which you did.

- Provide at least 3 different numerical summaries and/or displays of your data. Some examples of numerical summaries include mean, median, standard deviation, 5-number summary, correlation coefficient, and/or linear regression equation. Some examples of displays include pie chart, Pareto chart, frequency/relative frequency distribution, histogram, stem-and-leaf plot, and/or scatter plot.
- If you collect your own data, choose a topic of great interest to you personally. Your topic may address a social, political, health, educational (or etc.) issue of interest for a specified population of interest. Your topic should be something which can be tested by collecting a sample or doing an experiment. Do not limit your inquiry to such a narrowly defined population that anyone could collect a census to answer the question(s) definitively; the inquiry should lead you to make *an inference* about a population. Use a random sampling technique to collect data for an observational study, or design an experiment to test a claim. You may use public social media polls, conduct campus surveys, etc. Perhaps you will purchase randomly selected popular candy to determine a color frequency, or purchase and measure pinto beans after soaking in various solutions! Suppose you are interested in the social media habits of college students, so you may ask, "How many social media accounts do you

have?” You may consider if there is a difference between males and females in terms of a preferred social media type. Or perhaps you want to know what percentage of college students utilized math tutoring. The ideas are endless!

- Chapter 1 of our textbook provides helpful information about population parameters, sample statistics, sampling methods, and bias. Chapters 2, 3 and 4 provide helpful definitions, instructions and examples.

Part II: Inferential Statistics

Design a plan to address a specific question or questions about a population which can be answered by appropriately analyzing your data. Your plan must include the following components:

- Make clear hypotheses (null and alternative hypotheses) about one or more qualitative or quantitative variables of a well-defined population, as addressed by the data set you chose.
- Identify assumptions made about the population, sampling process/technique, or other facets of your investigation.
- Analyze your data and draw a conclusion or conclusions about the population for which you are making the inference. Additional summaries and/or graphs may be included.
- Provide a measure of confidence and/or a P-value and interpret it with respect to the population that was sampled.
- Speculate upon the meaningfulness of your results, as well as the limits and/or consequences of any statistical inferences made.
- Chapters 9 and 10 of our textbook provide helpful definitions, instructions and examples for completing Part II, such as interpreting confidence intervals and formulating and interpreting hypothesis tests.

Data Sets

In order to edit and analyze any of the data sets provided in the following StatCrunch list, be sure to:

- 1) Log in to our MLP course,
 - 2) Click the StatCrunch menu item on the left,
 - 3) Click the hyperlink to Visit the StatCrunch website, and **then**
 - 4) Click the desired data set link listed below (or next page).
- National Longitudinal Youth Survey by statcrunch_featured
<https://www.statcrunch.com/app/index.php?dataid=2433114>
 - Body Temperature by statcrunch_featured
<https://www.statcrunch.com/app/index.php?dataid=2188688>
 - California Home Prices 2009 by statcrunch_featured
<https://www.statcrunch.com/app/index.php?dataid=2188686>
 - Body Image Data Set by 33225049_ecollege_sacmlp
<https://www.statcrunch.com/app/index.php?dataid=1500063>
 - TrafficTickets by cvoisei <https://www.statcrunch.com/app/index.php?dataid=2284764>

- Pulse rate by bakerg@sc <https://www.statcrunch.com/app/index.php?dataid=339806>
- Credit Scores by craig_slinkman <https://www.statcrunch.com/app/index.php?dataid=423237>
- Responses to Social Media Survey by scsurvey
<https://www.statcrunch.com/app/index.php?dataid=2412748>
- Oreo Filling Weights by lancecurtis@cw <https://www.statcrunch.com/app/index.php?dataid=2360995>
- Fitness by amelia657@yahoo.com <https://www.statcrunch.com/app/index.php?dataid=412933>

Grading Criteria

- 1) Explanation: State the topical inquiry clearly and thoroughly so that the reader understands the variable of interest being explored. The population of interest should also be clearly and specifically defined. Include also *why* the topic was chosen. The reader should understand the motivation driving the inquiry.
- 2) Interpretation/Representation: Provide accurate descriptions and statistical summaries of data. Include appropriate inferences based on the data. Tables or graphs should be included, as applicable.
- 3) Design: Address the elements of statistical methods such as sampling technique, potential bias(es), and null and alternative hypotheses. Identify assumptions made, and/or conditions that need to be satisfied, regarding the population of interest, sample size needed, prior or historical parameter values, and the validity of, or confidence in, the conclusion(s) drawn.
- 4) Application/Analysis: Make a meaningful conclusion(s) regarding the population and variable(s) that were analyzed. Address the validity of, or confidence in, those conclusions, such as interpreting a P-value, and any limitations of the analysis. Include reasons, as applicable, for further inquiry.
- 5) Communication and Structure: Statistical summaries and inferences should be organized, formatted neatly, and presented clearly. The writer should communicate to the reader a cohesive story about one (or more) characteristics of a population. Avoid errors by using language that communicates the writer's meaning and purpose. Proper spelling and grammar are considered within this category.

Additional Resources

- Cite any sources used, such as a website, journal article or book, as applicable. Copying and pasting another's work without proper citation can be detected and will be considered cheating.
- Resources for statistics and current studies for reference:
 - 1) Pew Research Center <http://www.pewresearch.org/>
 - 2) Gallup <http://www.gallup.com/home.aspx>
 - 3) Data.Gov <https://www.data.gov/>
 - 4) Stat Trek <http://stattrek.com/>
 - 5) Pinterest <https://www.pinterest.com/explore/student-data-collection/>