

Statistics 104: Group Project

Statistics is about variation. By carefully collecting and analyzing data, we can begin to understand and explain variation. This project is intended to give you first hand experience in using the ideas presented so far in Stat 104 to collect data and perform a preliminary analysis on the data you collect. This is a **group** project. You are required to work in a group. All members of your group are equally responsible for the project and all members will receive the same grade on this assignment.

The focus of this project is on **collecting data, describing variation** and trying to **explain variation** in the resulting data. You will need to collect data on two variables, a response variable, Y, and an explanatory variable, X. You should choose a topic from the list below. Once you have chosen a topic you should:

1. Answer the question: Who are you going to collect data on? Remember this could be a bag of popcorn or a golf ball, not necessarily a person.
2. Answer the question: What data are you going to collect? Remember you need to collect data on two variables, an explanatory variable and a response variable. Be sure to indicate whether your variables are categorical or numerical.
3. Phrase a hypothesis about the relationship between your explanatory variable and your response variable. For example, for our M&M lab a hypothesis would be that the more M&Ms there are in the bag, the heavier the bag will be.
4. Decide how you are going to collect your data to investigate your hypothesis. Think about what equipment and materials you might need, if there is a monetary cost involved, etc. If you are doing a sampling study you must identify the population, population parameter of interest, and how you randomly selected your sample from the population. If you are doing an experiment you must discuss control of outside variables, how you used randomization in the experiment and how you used replication in the experiment. Refer to the ideas in Chapter 4 of the text.
5. Collect the data. You must have a minimum of 40 data pairs (rows in your JMP table).
6. Analyze your data. You must use JMP to construct plots and do the calculations. Use methods from Chapters 2 and 3 that are appropriate. Remember, the focus of the analysis is on describing and understanding variation in your response variable and on trying to explain variation by including the explanatory variable. Use previous homework and lab assignments for information about inputting data into JMP and running appropriate analyses. Turning in JMP output is not enough. **You must interpret the results of any analysis that JMP does.**
7. Write a final report. Your report should include sections on:
 - a. your hypothesis including the explanatory variable (factor) and response variable.
 - b. how you collected your data. Be specific.
 - c. the data. Include a table containing your data in the report.
 - d. the statistical analysis and its interpretation.
 - e. your conclusion stating what you have learned about your topic and your hypothesis from your data.

A major goal of this assignment is to give you an appreciation for obtaining useful data and learning from that data.

Possible Topics:

- Flight of paper airplanes or paper helicopters.

- What makes a rubber band fly furthest?
- Distance a golf ball rolls.
- The strength of paper towels.
- Quality of microwave popcorn.
- Quality of batteries.
- A topic of your choice but you must have your topic approved by your course instructor.

Grades will be determined on:

1. Explanation of your topic, hypothesis and how you collected your data [15 pts]
2. Relevance and completeness of the analysis of the data including appropriateness of your conclusions. [25 pts]
3. Clarity of the final report. [5 pts]
4. Adherence to guidelines and deadlines provided in this handout and any oral instructions given in class. [5 pts]

Time table: You may submit work anytime **on or before** the listed dates. Submissions after the dates listed below will result in deductions from your project score.

- **The end of lab period October 16:** Each group should turn in a sheet of paper with names of the group members and the topic chosen. Also, on this sheet answer the questions Who? and What? Identify the explanatory and response variables and indicate what kind of variables they are categorical or numerical. Formulate a hypothesis about the relationship between the explanatory and response variables.
- **The end of lab period on October 23:** Groups should turn in a detailed description of how they will collect their data.
- **The end of lab period on November 13:** Data collection completed. A copy of the data must be submitted and no changes to the data can be made after submission. Data should be submitted by attaching a JMP data table as an attachment to an email to your course instructor. You will **NOT** get this copy back so make sure you have a copy for your group. In this email you should also indicate how you intend to analyze the data, i.e. what sorts of graphs, and summary statistics you are going to look at.
- **The end of lab period on November 20:** Final report due. Submit only one report per group. Reports will **NOT** be returned. Each group member will receive a critique of the project and a project score.

Guidelines: Work submitted for this project must follow the guidelines below. Failure to follow these guidelines will result in deductions from your project score.

- All work submitted for this project must include the names of all group members.
- Final reports must be printed using either an ink-jet or laser printer.
- The final report must be written in the same manner as a term paper. The report should contain sections, paragraphs, complete sentences, and **NO** misspelled words. You should divide your report into sections, making sure to clearly label these sections.
- All graphs and plots must be computer generated. Hand-drawn plots or graphs **will not be accepted**. Use the information from previous homework assignments to create and print graphs using the computer program JMP. JMP output can be saved in a format compatible with WORD. To do this, go to **File – Save as** menu in JMP. Change the **Save as type** to either RTF File (*.rtf) or Microsoft Word 2000+ (*.doc). Either of these files can be opened in WORD. Additionally, you can COPY/PASTE any JMP output into WORD.