**Grading Rubrics for Data Analysis Report**

**Foundations Skill: Reading**

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| **4—Mastery** | **3—Proficiency** | **2—Minimal Competency** | **1—Deficiency** |
| * Introduction shows clear and precise understanding of the Project’s Research Question.
* **Reading Data in Context**: Introduction shows clear understanding of the source of the data and purposes for which it was collected.
* **Reading for Structure**: In Methods section, Attentive to the type of relevant variables in the dataset; aware of the different parts of a graphical or numerical summary.
* **Reading Data to Interpret**: Methods and Results sections show excellent choice of graphical and/or numerical devices in Descriptive Statistics, in order to summarize data.
* **Reading Descriptive Statistics to Interpret**: Correctly assesses relevant patterns in the data that are indicated by the chosen graphical and numerical devices.
* **Critical Engagement**: In Methods and Conclusions section**s:** attentive to the possibility of lurking variables or confounding factors; distinguishes between patterns in a sample and patterns in the population.
* **Critical Engagement**: Keenly aware ofunusual observations**.** Makes a well-reasoned choice as to whether to retain them.
 | * Introduction shows good understanding of the Research Question.
* **Reading Data in Context**: Shows sufficient understanding of the source of the data and purposes for which it was collected.
* **Reading for Structure**: Student is aware of the type of variables in the dataset; and different parts of a graphical or numerical summary.
* **Reading Data to Interpret**: Good choice of graphical and/or numerical devices in Descriptive Statistics; choices not always optimal.
* **Reading Descriptive Statistics to Interpret**: For the most part, gives correct assessments of relevant patterns in the data that are indicated by the chosen graphical and numerical devices.
* **Critical Engagement:** Attuned to possibility of lurking variables or confounding factors, but may miss some. Reliably distinguishes between patterns in a sample and patterns in the population.
* **Critical Engagement**: Aware ofunusual observations**.** Makes a choice as to whether to retain them.
 | * Partially misinterprets the Research Question.
* **Reading Data in Context**: Failure to consider the source of the data and purposes for which it was collected causes some problem in the analysis of it.
* **Reading for Structure**: Misses significance of variable-type somewhat, and does not attend to all important parts of a graphical or numerical summary.
* **Reading Data to Interpret**: Sometimes employs incorrect or misleading graphical and/or numerical techniques.
* **Reading Descriptive Statistics to Interpret**: Sometimes misconstrues patterns in the data that are indicated by the chosen graphical and numerical devices.
* **Critical Engagement:** Not enough consideration of the possibility of lurking variables or confounding factors; sometimes conflates patterns in data with patterns in the population.
* **Critical Engagement**: Might miss some unusual observations, or show little concern as to whether they belong in the data.
 | * Either fails to understand the Research Question or ignores it completely.
* **Reading Data in Context**: Unwillingness to consider the source of the data and purposes for which it was collected causes dooms analysis to failure. **Reading for Structure**: Misses significance of variable type altogether; ignores important parts of a graphical or numerical summary.
* **Reading Data to Interpret**: Employs incorrect or misleading graphical and/or numerical techniques.
* **Reading Descriptive Statistics to Interpret**: Grossly misconstrues patterns in the data that are indicated by the chosen graphical and numerical devices.
* **Critical Engagement:** No consideration of problems that can arise in the interpretation of data; indicates no awareness of the distinction between population and sample.
* **Critical Engagement**: Shows little or no sign of checking for unusual observations.
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**Foundations Skill: Writing**

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| **4—Mastery** | **3—Proficiency** | **2—Minimal Competency** | **1—Deficiency** |
| * Report material is clearly and properly divided into Introduction, Methods, and Results and Conclusions sections. All sections serve their assigned purpose.
* Relevant R Code chunks are interwoven correctly with text, creating an excellent logical flow in which claims made in the text are illustrated or verified by tables/graphs.
* Student is beginning to use markup techniques for display of equations and mathematics. Smart use of markup for bullet lists, numbered lists, boldface, italics, web links, etc.
* Text shows excellent spelling, grammar, and mechanics.
* Graphs convey information with clarity and density. Titles, labels on axes, legends, captions, etc., are carefully chosen.
* Student demonstrates facility with R code beyond the minimum prescribed for exams, approaching the level of programming employed in course Markdown documents.
* The Markdown document knits into html without errors. Un-needed R code is not echoed.
 | * Report material is divided into Introduction, Methods, Results and Conclusions sections, with most material in the right place.
* Relevant R Code chunks are interwoven with text, creating a good logical flow in which points made in the text are illustrated when chunk is run and/or the Markdown document is knit.
* Student employs markup techniques well to enhance the format of the text.
* Text shows good spelling, grammar, and mechanics.
* Graphs convey information clearly, with at most minor shortcomings in title, labels, captions, etc.
* Student attempts, with some success, to use R code beyond the minimum prescribed for exams.
* The Markdown document knits into pdf without errors. Some R code not needed in the textual discussion may be echoed.
 | * All required sections are present, but significant material is not in the right section.
* Relevant R Code chunks are interwoven with text, but some are misplaced, interfering with logical flow.
* Student employs some markup techniques to enhance text format, but with a minor error or two.
* Text shows significant problems with spelling, grammar, or mechanics.
* Graphs do not always convey information well. Titles, labels, legends, captions, etc. may be lacking.
* Student use of R code does not go beyond the minimal level prescribed for exams.
* An error or two in code or yaml front-matter prevents the Markdown document from knitting into pdf. Most or all of the R code is echoed without regard to whether it is discussed in the text.
 | * The four-section requirement is ignored, or when followed it lends no structure to the report.
* R Code chunks are not interwoven with text, and are often irrelevant to the solution, resulting in little or no logical flow.
* Markup techniques are very little employed or are wrongly used, resulting in ugly text format.
* Pervasive problems with spelling, grammar, and mechanics make the report difficult to understand.
* Graphs convey information poorly. No attempt to provide good titles, labels, captions or legends.
* Student use of R code is below the minimal level prescribed for exams.
* Many errors in code or yaml front-matter prevent the Markdown document from knitting into pdf. No signs of effort to produce a polished document.
* **Document lacks a proper title, date or author name.**
* **Hard-copy of document is not printed properly.**
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**Foundations Skill: Argumentation**

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| **4—Mastery** | **3—Proficiency** | **2—Minimal Competency** | **1—Deficiency** |
| * Backs up descriptions of patterns in data or a population with specific and well-chosen numbers; specifically draws the reader’s attention to relevant details of graphs that illustrate his/her interpretation of data.
* Graphs and numerical summaries are all highly relevant to his/her argument.
* Shows excellent ability to synthesize a variety of results into an overall conclusion.
* Is keenly aware of problems with the data or shortcomings of his/her methods of analysis that may cast doubt on his/her conclusion. Is able to articulate what steps might be taken in the future to improve the analysis.
 | * Backs up descriptions of patterns in data or a population with specific numbers, choices not always optimal; draws the reader’s attention to relevant details of graphs that illustrate his/her interpretation of data; seldom overlooks important details.
* Graphs and summaries are all relevant to the argument, but some might not be the best choice to illustrate a given point.
* Reasonably good synthesis of result into a final conclusion.
* Shows awareness of problems in data or shortcoming of methods used, but is unable to say what steps might be taken to improve the analysis.
 | * Sometimes does not back up descriptions of patterns in data or a population with specific numbers, includes too many details or irrelevant details in the description. Produces graphs, but too often lets them “speak for themselves.”
* Some graphs or summaries are not relevant to his/her argument.
* Some results not properly related to his/her conclusion.
* Is aware of some problems in data or analysis, but misses others.
 | * Does not back up descriptions of patterns in data or a population with specific numbers or relevant graphs.
* Many graphs or summaries are not relevant to his/her argument.
* Material in the results section is largely unrelated to the conclusion and may even contradict it. The conclusion may not even be stated.
* Misses many important problems in the data or his/her analysis.
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**Grading Procedure:** The following table indicates the grade ranges, based on rubric score, for the two stages of the Report.

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| **Total Points** | **Draft Version Grade** | **Final Version Grade** |
| 11-12 | A | A |
| 10 | A | AB |
| 8-9 | AB | B |
| 7 | B | BC |
| 5-6 | BC | C |
| 4 | C | D |
| 3 | D | F |
| < 3 | F | F |