**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. |

**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.** |

**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. |

**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 |