



MAT 300 Final Project Guidelines and Rubric

Overview

The final project for this course is the creation of a statistical regression report. Based on the knowledge obtained in this course and previous course work, you will examine the methodology used in building and performing regression diagnostics. You must select a statistical data source with approval of your instructor. You must collect data, perform regression diagnostics, and determine the most appropriate set of predictors. The project is divided into **two milestones**, which will be submitted at various points throughout the course to scaffold learning and ensure quality final submissions. These milestones will be submitted in **Module Three and Module Seven**.

Outcomes

To successfully complete this project, you will be expected to apply what you have learned in this course and should include several of the following course outcomes:

1. Construct multiple regression models, including first-order, second-order, and interaction models with both quantitative and qualitative variables
2. Assess whether a multiple regression model fits the sample data
3. Implement regression analysis in real-world problems from engineering, sociology, psychology, science, or business
4. Identify potential problems one may encounter when conducting regression analysis
5. Demonstrate how residuals may be used to detect departures from model assumptions

Main Elements

In the Final Project you will build and perform regression diagnostics on several models in order to determine the most appropriate set of predictors and subsequently the most appropriate model. You must choose a topic of interest drawn from real-life experiences. You must collect data for this project and complete the following:

- Identify your variables, and categorize your response and predictors (qualitative and quantitative predictors).
- You must produce a scatterplot of the outcome variable versus each of the predictors.
- Conduct a first-order main effects model.
- Conduct an analysis of the model using regression diagnostics to determine whether the model is appropriate.
- Determine which additional terms (higher-order or interaction) should be included. You may go through several iterations of this process before you decide on your final model. Your final model must have at least one quantitative variable and one qualitative variable.
- Perform a nested F-test on your final model and a reduced model of your choice to show that the final model is the better one.

Use your findings from the above model building and resulting analysis and write a paper summarizing your findings. Include relevant Minitab output (charts, graphs, regression results) in your statistical regression report. Refer to module content and the case studies in your text for additional resources. Your paper must including the following parts:

- I. Introduction:** Include your topic, your variables, an overall description of your data, the means of collecting data, and what you hope to achieve in your findings. Include any predictions as needed.
- II. Regression Model Building:** Describe the results of the model you built. You must include the following information about **both** the first-order main effects model **and** the final model:
 - A scatterplot of the outcome vs. predictor variables
 - The model equation in general form
 - The complete regression output from Minitab including any unusual predictors
 - A written explanation of why the model was/was not chosen (i.e., why those predictors were selected)
 - The R² value and its interpretation
 - Regression diagnostics and your impression of them

- The interpretation of each of the coefficients included in the final model

III. **Testing Model and Comparison of Models:** Looking at your variables, only include those variables that are necessary. Conduct a reduced model as needed. Perform a nested model F-test on your final model compared to the researcher's suggested model. Explain why the outcome of this test shows that your model is the more appropriate one. Compare and contrast the original model and the final model and discuss the strengths or weaknesses of both based on R² and the regression diagnostics. Also comment on the importance of an iterative model-building process. Particularly pay attention to the reasons why it is imperative that each model built is carefully examined.

What are the implications of just using the first model built?

IV. **Conclusion:** Interpret your results in context of your topic.

Milestones

Milestone One: Topic & Introduction Due

In **Task 3-5**, you will submit your topic and Introduction for instructor approval. **This is non-graded milestone for formative feedback only.**

Milestone Two: Final Project: Submit

In **Task 7-3**, you will submit your final project for review. **This will be graded using the below rubric.**

What to Submit

Written components of projects must follow these formatting guidelines when applicable: double spacing, 12-point Times New Roman font, one-inch margins, and discipline-appropriate citations. Your paper should be a minimum of 10 pages in length, not including the cover page or resources.

Final Project Rubric

Criteria	Exemplary (100%)	Proficient (85%)	Needs Improvement (55%)	Not Evident (0%)	Value
Main Elements	Includes almost all of the main elements and requirements and cites multiple examples to illustrate each element	Includes most of the main elements and requirements and cites many examples to illustrate each element	Includes some of the main elements and requirements	Does not include any of the main elements and requirements	25
Analysis of Data	Effectively applies relevant regression methodology outlined in the course and successfully interprets the results in context	Effectively applies some relevant regression methodology outlined in the course and interprets the results in context	Applies regression methodology effectively, but did not interpret the results in context	Some regression methodology outlined in the course is applied incorrectly	20
Integration and Application	All of the course concepts are correctly applied	Most of the course concepts are correctly applied	Some of the course concepts are correctly applied	Does not correctly apply any of the course concepts	10
Problem Solving	Effectively designs, evaluates, and implements a strategy to achieve a desired goal	Designs, evaluates, and implements a strategy with moderate effectiveness to achieve a desired goal	Designs and evaluates a strategy to achieve a desired goal	Is not able to design, evaluate, and implement a strategy to achieve a desired goal	20
Quantitative Literacy	Effectively works with numerical data and solves quantitative problems in authentic context in everyday life	Works with numerical data and solves quantitative problems in authentic contexts with moderate effectiveness	Works with numerical data and solves quantitative problems with minimal effectiveness	Is not able to work with numerical data and solve quantitative problems	15

Criteria	Exemplary (100%)	Proficient (85%)	Needs Improvement (55%)	Not Evident (0%)	Value
Writing (Mechanics/ Citations)	No errors related to organization, grammar and style, and/or citations	Minor errors related to organization, grammar and style, and/or citations	Some errors related to organization, grammar and style, and/or citations	Major errors related to organization, grammar and style, and/or citations	10
Total:					100%