Northeastern University
College *of* Professional Studies

Hypothesis Testing

Overview and Rationale

In order to provide practices in using R functions to conduct hypothesis tests, you are asked to complete one and two-sample t-tests and an F-test. Start by reviewing the supporting materials that provide R syntax and examples:

- Using T-Tests in R from Department of Statistics at UC Berkley
- Test of equal or given proportions from R Documentation
- F-Test: Compare Two Variances in R from STHDA (Statistical tools for high-throughput data analysis)

Course Outcomes

This assignment is directly linked to the following key learning outcomes from the course syllabus:

- Make statistical inferences about parameter in real world problems.

Assignment Summary

First, load the MASS library in R.

A. Package 'MASS' which provides a description of the datasets available in the MASS package

Then, complete the following analysis of the identified data from the library.

B. One-sample t-test:

   Use the "*chem*" dataset to answer the question, "is the flour production company producing whole meal flour with greater than 1 part per million copper in it?"

C. Two-sample t-test:

   Use the "*cats*" dataset to answer the question, "do male and female cat samples have the same body weight?"

   Hint: one way to get separate vectors for male and female cat body weight is to use the subset function as follows: "male <-subset(cats, subset=(cats$Sex=M))"

D. Paired t-test:

Use the "*shoes*" dataset to answer the question, "did material A wear better than material B?"

E. Test of equal or given proportions:

   Use the "*bacteria*" data set to answer the question, "did the drug treatment have a significant effect of the presence of the bacteria compared with the placebo?"

F. F-test:

   Use the "*cats"* data set to test for the variance of the body weight in male and female cats.

Report

Your assignment should have a good cover/title page, introduction of the goals of the project and the methods you used. It also should follow APA format with at least 500 words (excluding title page and references page) and references page. In the body of your project you should incorporate the R codes and R outputs with interpretation of your results. You need to make sense of your results to make good points to show your understanding of the course material and its application to the dataset.

Graphs, figures, charts, tables are very useful to increase visual effects to impress your readers. You also should do your best to give insight and understanding to the project with a good conclusion. Please use subtitles to make your assignment more reader friendly as well.

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Assignment Rubric

Category	Meets Standards	Approaching Standards	Below Standards
Introduction	Introduction provides a brief and intelligible overview of the goals and methods of the assignment	Introduction provides an overview of the goals and methods of the assignment, but is ambiguous or not concise	Does not introduce project goals, project questions or methods.
Analysis	Provides all R code and the outputs. Includes interpretation of the output, graphs, figures, charts, and tables and the significance of the results in the analysis.	Provides R codes and outputs, but the R code does not match the outputs or is missing some code or outputs. Includes limited interpretations, charts, and tables and the significance of the results in the analysis.	Does not provide R code or its outputs or minimal R code is provided. Includes few interpretations, charts, or tables. Does not identify the significance of the results in the analysis
Data Visualizations	Data visualizations are appropriate for the level and type of analysis. Graphs, figures and tables communicate insights and significance to the reader.	Data visualization are useful for the level and type of analysis, but graphs, figures and tables do not clearly communicate significance of the results to the reader.	Data visualization are used minimally or not at all. If graphs, figures and tables are used, it is unclear what they are intended to communicate or why.
Interpretation & Conclusions	The conclusion summarizes and makes sense of the results, making good points that reflect clear understanding of the assignment material.	The conclusion summarizes and makes sense of the results, making good points that reflect a basic understanding of the assignment material.	The conclusion does not summarize or attempt to make sense of the results. Conclusions do not reflect an understanding or reflect a misunderstanding of the material
Report: Writing Mechanics, Title Page, & References	There are no noticeable errors in grammar, spelling, and punctuation; and completely correct usage of title page, citations, and references. The report contains approximately of 1000 words	There are very few errors in grammar, spelling, and punctuation; and completely correct usage of title page, citations, and references. The report contains approximately 1000 words	There are more than five errors in grammar, spelling, and punctuation; or the usage of title page, citations, and references are incomplete; or the report contains far less than 1000 words

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