STAT 101B Homework # 4 Spring 2024

Due Friday, May 17th, 2024 @ 11:59 PM

You do not need to include all your R code in the assignment, but be sure to include important graphs and tables in a format that is easy to read. Include the assignment number, your name, UCID, and section number in all homework assignments. Upload to Bruinlearn. Use complete sentences, but be concise. Late homework is not accepted, with no exceptions.

Q1) Read the article posted on Bruinlearn: Reading linear texts on paper versus computer screen: Effects on reading Comprehension.

- The data for this research paper is also posted on BruinLearn week 7

A) List the variables measured in this study. Response, factors, blocks, held constant factors. What would you add to enhance this study in terms of factors and design?

B) How many participants were there? Do you think they are enough? What is the associated power with the sample size chosen in this study?

C) What does the author mean by "With respect to reliability, all texts used in this study, both for pretesting and in the main survey had Cronbach's alpha >.75."

D) Using R, download the posted data and perform the t-tests posted on page 64 (section 3. Results). Then create an interaction plot using type of gender and condition to get "Word chain" responses. Comment on your plot.

E) Using R, redo the MLR and the t-tests listed in tables 1 and 2 on page 65. What would be your final MLR. Summarize your results in an ANOVA table for each MLR in table 2. Check the assumptions.

Q2) Association between Baldness Level and Heart Disease:

Early baldness higher heart disease risk factor than obesity, says study: ***By Ian Westbrook***

Male pattern baldness and premature greying are more of a risk factor for heart disease than obesity in men under 40, new research suggests.

A study of more than 2,000 young men in India showed more who had coronary artery disease were prematurely bald or grey than men with a full head of hair.

The research, to be presented at the CSI's 69th annual conference in Kolkata, studied 790 men under 40 who had coronary artery disease and 1,270 healthy men of a similar age, who acted as a control group.

- A clinical history was taken of all the participants, who were then marked on their levels of male pattern baldness - the common type of hair loss that develops in most men at some stage - and hair whitening.
- The researchers correlated the findings with the severity of heart disease symptoms.

- They discovered that the men with the heart condition were more likely to have gone prematurely grey - 50% compared with 30% of the healthy group - more than five times the risk of the control group.
- The heart condition group were also more likely to have male pattern baldness - 49% against 27% of those in the healthy group - a 5.6 times greater risk.

The Link for the Complete Article **By Ian Westbrook** is on: https://www.bbc.com/news/health-42164898#:~:text=Male%20pattern%20baldness%20and%20premature,a%20full%20head%20of%20hair.

The data at hand (bruinlearn Week 7) has 1435 observations; two categorical variables were measured:

1) Heart_Disease (Yes or No)
2) Bladness Level (little, much, none, and some)

A. Import the baldness data set. Call it `baldness`
B. Report the dimension of the data
C. Report the names of the variables in the data.
D. State the Null and Alternative Hypotheses for such context.
E. To report the tally of both categorical variables simultaneously we use table(first, second) and we can also report the row or column proportions per category.
F. Visualize each categorical variable separately visualize both categorical variables at the same time (stacked bar chart)
G. Conduct a Chi-square test and report your findings. Do you reject the Null Hypothesis?

Q3) Project Related Question:

A) State the title for your study.

B) Which one following designs are you adopting for your project?

1. Basic Factorial Design
2. Randomized Complete Block Design
3. Latin Square/ Graeco Latin Square Design
4. Split Plot/ Repeated Measures Design
5. 2^k Factorial Design
6. 3^k Factorial Design

C) What is the minimum sample size needed for your study? Take a screenshot of your G-Power calculation screen.