Statistics Advance-6

Assignment Questions

PW SKILLS

Q1. Explain the assumptions required to use ANOVA and provide examples of violations that could impact the validity of the results.

Q2. What are the three types of ANOVA, and in what situations would each be used?

Q3. What is the partitioning of variance in ANOVA, and why is it important to understand this concept?

Q4. How would you calculate the total sum of squares (SST), explained sum of squares (SSE), and residual sum of squares (SSR) in a one-way ANOVA using Python?

Q5. In a two-way ANOVA, how would you calculate the main effects and interaction effects using Python?

Q6. Suppose you conducted a one-way ANOVA and obtained an F-statistic of 5.23 and a p-value of 0.02. What can you conclude about the differences between the groups, and how would you interpret these results?

Q7. In a repeated measures ANOVA, how would you handle missing data, and what are the potential consequences of using different methods to handle missing data?

Q8. What are some common post-hoc tests used after ANOVA, and when would you use each one? Provide an example of a situation where a post-hoc test might be necessary.

Q9. A researcher wants to compare the mean weight loss of three diets: A, B, and C. They collect data from 50 participants who were randomly assigned to one of the diets. Conduct a one-way ANOVA using Python to determine if there are any significant differences between the mean weight loss of the three diets. Report the F-statistic and p-value, and interpret the results.

Q10. A company wants to know if there are any significant differences in the average time it takes to complete a task using three different software programs: Program A, Program B, and Program C. They randomly assign 30 employees to one of the programs and record the time it takes each employee to complete the task. Conduct a two-way ANOVA using Python to determine if there are any main effects or interaction effects between the software programs and employee experience level (novice vs. experienced). Report the F-statistics and p-values, and interpret the results.

Q11. An educational researcher is interested in whether a new teaching method improves student test scores. They randomly assign 100 students to either the control group (traditional teaching method) or the experimental group (new teaching method) and administer a test at the end of the semester. Conduct a two-sample t-test using Python to determine if there are any significant differences in test scores between the two groups. If the results are significant, follow up with a post-hoc test to determine which group(s) differ significantly from each other.

Q12. A researcher wants to know if there are any significant differences in the average daily sales of three retail stores: Store A, Store B, and Store C. They randomly select 30 days and record the sales for each store on those days. Conduct a repeated measures ANOVA using Python to determine if there are any significant differences in sales between the three stores. If the results are significant, follow up with a post-hoc test to determine which store(s) differ significantly from each other.

Note: *Create your assignment in Jupyter notebook and upload it in GitHub & share that github repository link through your dashboard. Make sure the repository is public.*