Psy516 Final Terms Key Point by

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1. Confidence Interval-II (89)

- **Key Points**:
  - A confidence interval (CI) provides a range of values within which we expect the true population parameter to fall, with a certain level of confidence (e.g., 95%).
  - The width of the CI depends on the sample size and variability.
- **Analogy**: Think of a confidence interval as a fishing net cast into a lake to catch fish. A larger net (larger sample size) and a better understanding of where the fish are (less variability) will give you a better chance of catching the fish you want (narrower CI).
- **Real-Life Example**: If a survey estimates that 60% of people in a city support a new policy with a 95% CI of 55% to 65%, it means we are 95% confident that the true level of support falls within that range.

2. Hypothesis Testing-I (93)

- **Key Points**:
  - Hypothesis testing is a method to determine if there is enough evidence to reject a null hypothesis (H_0) in favor of an alternative hypothesis (H_1).
  - Involves setting up null and alternative hypotheses, calculating a test statistic, and comparing it to a critical value.
- **Analogy**: Imagine you're a detective trying to prove a suspect's innocence. The null hypothesis is that they are innocent, and you need sufficient evidence (test statistic) to reject this and prove they are guilty (alternative hypothesis).
- **Real-Life Example**: Testing whether a new drug is more effective than an existing one. The null hypothesis might be that the new drug is no better than the old one, and you test this by comparing outcomes.

3. Hypothesis Testing-II (101)

- **Key Points**:
  - This often involves determining Type I and Type II errors.
  - Type I error: Rejecting H_0 when it is actually true.
  - Type II error: Failing to reject H_0 when it is actually false.
- **Analogy**: A Type I error is like accusing someone of a crime they didn’t commit, while a Type II error is like failing to convict someone who is guilty.
- **Real-Life Example**: If a new teaching method is actually better but the study fails to show this (Type II error), students might miss out on a better learning experience.

4. Hypothesis Testing-III (106)

- **Key Points**:

    - Deals with more advanced hypothesis testing techniques and understanding p-values.
    - P-value indicates the probability of observing the test results under the null hypothesis.
- **Analogy**: If you're searching for a rare book in a library, a low p-value is like finding the book in an unusual section, suggesting it's not where you'd expect.
- **Real-Life Example**: A p-value of 0.03 means there's a 3% chance of seeing the observed data if the null hypothesis were true.

5. Hypothesis Testing-IV (108)

- **Key Points**:
    - Includes considerations for power analysis and sample size requirements.
- **Analogy**: Planning a large-scale event requires knowing how many people will attend. A power analysis helps you determine if you have enough resources to detect an effect if there is one.
- **Real-Life Example**: Determining the appropriate sample size for a clinical trial to ensure it can detect a significant effect of a new treatment.

6. T-Test-I (112)

- **Key Points**:
    - T-tests compare means between two groups.
    - Types include one-sample t-test, independent samples t-test, and paired samples t-test.
- **Analogy**: Comparing test scores between two classes is like checking if two different batches of cookies have the same taste. A t-test helps determine if any differences are significant or just due to chance.
- **Real-Life Example**: Comparing average test scores of students taught with two different teaching methods.

7. T-Test-II (122)

- **Key Points**:
    - Focuses on assumptions and calculations specific to t-tests.
- **Analogy**: Think of it as checking the recipe and ingredients before baking to ensure the results are valid.
- **Real-Life Example**: Ensuring that assumptions like normality and equal variances are met when comparing treatment effects.

8. Independent Sample T-test-I (126)

- **Key Points**:
    - Used to compare means between two independent groups.
- **Analogy**: Comparing the average height of people from two different cities.

- **Real-Life Example**: Comparing blood pressure levels between patients receiving two different medications.

9. Independent Sample T-test-II (134)

- **Key Points**:
  - Involves hypothesis testing and interpretation for independent samples.
- **Analogy**: Like comparing the average scores of two different groups in a sports competition.
- **Real-Life Example**: Comparing the effectiveness of two different diet plans on weight loss.

10. Repeated Measure T-Test (143)

- **Key Points**:
  - Used to compare means from the same group at different times or conditions.
- **Analogy**: Checking if a plant grows differently with two types of fertilizers over time.
- **Real-Life Example**: Measuring a group's stress levels before and after a stress management program.

11. Analysis of Variance (ANOVA) (151)

- **Key Points**:
  - ANOVA is used to compare means across multiple groups.
- **Analogy**: Comparing average scores of students from multiple classes to see if there's a difference in teaching effectiveness.
- **Real-Life Example**: Comparing the effectiveness of three different teaching methods on student performance.

12. One-Way ANOVA (156)

- **Key Points**:
  - Tests for differences among three or more groups based on one factor.
- **Analogy**: Comparing test scores among different classrooms where each classroom uses a different teaching method.
- **Real-Life Example**: Comparing the performance of three different brands of shoes in a sports performance test.

13. Two-Way ANOVA-I (161)

- **Key Points**:
  - Examines the effect of two factors and their interaction on the dependent variable.
- **Analogy**: Comparing how both the teaching method and study environment affect student performance.
- **Real-Life Example**: Examining how different diets and exercise routines affect weight loss.

14. Two-Way ANOVA-II (173)

- **Key Points**:
  - Involves more complex interactions and interpretation of results.
- **Analogy**: It's like examining how different types of fertilizer and watering schedules affect plant growth together.
- **Real-Life Example**: Studying the interaction between medication type and dosage on patient recovery.

15. Correlation Analysis-I (175)

- **Key Points**:
  - Measures the strength and direction of the relationship between two variables.
- **Analogy**: Checking if there's a pattern or connection between hours studied and test scores.
- **Real-Life Example**: Analyzing if there's a correlation between exercise frequency and overall health.

16. Correlation Analysis-II (180)

- **Key Points**:
  - Focuses on the types and strength of correlation.
- **Analogy**: Like checking if the number of hours watched TV correlates with a drop in academic performance.
- **Real-Life Example**: Investigating if higher customer satisfaction correlates with repeat business.

17. Correlation Analysis-III (182)

- **Key Points**:
  - Deals with more advanced correlation techniques.
- **Analogy**: Using more precise tools to measure and understand the relationship between variables.
- **Real-Life Example**: Using statistical software to analyze complex relationships in large datasets.

18. Types of Correlation-I (188)

- **Key Points**:
  - Different types of correlation coefficients, like Pearson's r.
- **Analogy**: Comparing the strength of different types of relationships, such as strong vs. weak connections.
- **Real-Life Example**: Analyzing the relationship between age and income.

19. Introduction to Regression (191)

- **Key Points**:
  - Regression analysis predicts the value of one variable based on another.
- **Analogy**: Predicting a plant's growth based on the amount of water it receives.
- **Real-Life Example**: Predicting a person's weight based on their height and age.

20. Simple Linear Regression (197)

- **Key Points**:
  - Examines the relationship between two variables with a straight line.
- **Analogy**: Drawing a line to show how the amount of time spent studying predicts exam scores.
- **Real-Life Example**: Predicting sales based on advertising expenditure.

21. Multiple Linear Regression (204)

- **Key Points**:
  - Explores the relationship between one dependent variable and multiple independent variables.
- **Analogy**: Predicting a car's price based on multiple factors like age, mileage, and condition.
- **Real-Life Example**: Predicting a student's academic performance based on study hours, sleep, and class attendance.

22. Non-Parametric Test (211)

- **Key Points**:
  - Used when data doesn't meet parametric test assumptions, often for ordinal data.
- **Analogy**: Using a different type of test when you can't use the standard one because the data doesn't fit its requirements.
- **Real-Life Example**: Using a Mann-Whitney U test to compare medians when data isn't normally distributed.

23. Chi-Square Test for Independence-I (213)

- **Key Points**:
  - Tests if two categorical variables are independent.
- **Analogy**: Checking if the choice of beverage (tea or coffee) is independent of age group.
- **Real-Life Example**: Determining if there's an association between gender and preference for a type of movie.

24. Chi-Square Test for Independence-II (221)

- **Key Points**:
  - Focuses on more complex scenarios and interpretations.
- **Analogy**: Expanding the independence test to include more categories or factors.

- **Real-Life Example**: Examining the relationship between different levels of education and job satisfaction.

25. Mann-Whitney U-Test (225)

- **Key Points**:
  - A non-parametric test for comparing differences between two independent groups.
- **Analogy**: Comparing test scores of two groups without assuming a normal distribution.
- **Real-Life Example**: Comparing patient satisfaction between two different hospitals.

26. Wilcoxon Signed Rank Test (228)

- **Key Points**:
  - A non-parametric test for comparing two related samples.
- **Analogy**: Comparing pre- and post-treatment scores in the same group without assuming normality.
- **Real-Life Example**: Measuring improvement in symptoms before and after treatment in the same group of patients.

27. Kruskal-Wallis & Friedman Test (230)

- **Key Points**:
  - Non-parametric tests for comparing more than two groups or related samples.
- **Analogy**: Using these tests to compare satisfaction levels across multiple groups or over multiple time points.
- **Real-Life Example**: Comparing customer satisfaction across different branches of a retail store.