

Testing Differences Between Two Independent Groups 01

(2024 Spring EN5423 - week07)

Question 1

Which of the following tests does NOT require the assumption that the data follow a normal distribution? A) t-test B) Rank-sum test C) Permutation test of difference in means D) All of the above require the normal distribution assumption.

Answer: B) Rank-sum test

Explanation: The Rank-sum test is a nonparametric test that does not assume normal distribution of the data. It is used to compare the medians between two independent groups. The t-test, on the other hand, requires the data to follow a normal distribution.

Question 2

What is the main assumption behind the permutation test of difference in means? A) The data must follow a normal distribution. B) The variances of the two groups must be equal. C) The data from the two groups are exchangeable. D) The sample size must be large.

Answer: C) The data from the two groups are exchangeable.

Explanation: The permutation test assumes that the data from the two groups are exchangeable, meaning any data point could belong to either group. This test does not require the normal distribution or equal variances assumptions.

Question 3

What does a low p-value indicate in the context of a rank-sum test? A) The two groups have identical medians. B) There is insufficient evidence to conclude a difference between group medians. C) There is a statistically significant difference between the medians of the two groups. D) The data must be normally distributed.

Answer: C) There is a statistically significant difference between the medians of the two groups.

Explanation: A low p-value in a rank-sum test suggests that the difference observed between the two groups' medians is statistically significant, meaning it is unlikely to have occurred by random chance alone.

Question 4

Which statement is true regarding the assumptions of the t-test? A) The t-test does not assume equal variances between groups. B) The t-test requires that both groups of data are normally

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distributed. C) The t-test is applicable for skewed data without any adjustments. D) The t-test assumes the data are ordinal.

Answer: B) The t-test requires that both groups of data are normally distributed.

Explanation: The t-test assumes that the data from each group are normally distributed around their respective means. It originally also assumed equal variances between the groups, though adjustments for unequal variances (e.g., Welch's t-test) can be made.

Question 5

What correction is applied in the rank-sum test to account for tied ranks in the calculation of the standard deviation of the large-sample test statistic? A) The Hodges-Lehmann correction B) The Welch correction C) The Satterthwaite correction D) The tie correction formula

Answer: D) The tie correction formula

Explanation: When calculating the large-sample approximation in the rank-sum test and there are tied ranks, a tie correction for the standard deviation (σ_{Wt}) is necessary. This adjusts the standard deviation to accurately reflect the presence of ties, using the specific formula provided in the material for σ_{Wt} .