Statistics Advance quiz

7 out of 7 correct

1. What is the main difference between t-tests and z-tests?

- ◯ T-tests require a larger sample size than z-tests
- ◯ T-tests assume a known population variance while z-tests assume an unknown population variance
- ◯ Z-tests require a smaller sample size than t-tests
- ◉ Z-tests are used for testing two population means while t-tests are used for testing one population mean

Explanation: T-tests are used when the sample size is small and/or the population variance is unknown, while z-tests are used when the sample size is large and/or the population variance is known.

2. In hypothesis testing, what is a Type 1 error?

- ◉ Rejecting a true null hypothesis
- ◯ Failing to reject a false null hypothesis
- ◯ Rejecting a false alternative hypothesis
- ◯ Failing to reject a true alternative hypothesis

Explanation: x A Type 1 error occurs when we reject the null hypothesis when it is actually true. The probability of making a Type 1 error is denoted by alpha and is typically set at 0.05 or 0.01.

3. What is the margin of error in a confidence interval?

- ◯ The width of the confidence interval

- [x] The maximum amount a point estimate can be off from the true population parameter
- [ ] The probability of making a Type 1 error
- [ ] The probability of making a Type 2 error

Explanation: The margin of error is a measure of the precision of a point estimate, indicating the maximum amount it could be off from the true population parameter, with a certain level of confidence.

4. A researcher wants to compare the mean weight of two different groups of mice. One group has a sample size of 25 and the other group has a sample size of 50. Which test should the researcher use to compare the means?

- [x] T-test
- [ ] Z-test
- [ ] Both tests can be used
- [ ] Neither test can be used

Explanation: When comparing means of two independent groups, a t-test should be used if the sample sizes are small or the population variance is unknown. In this case, the sample sizes are not very large, so a t-test would be appropriate.

5. A researcher wants to estimate the probability of a hypothesis based on new evidence. Which statistical tool should they use?

- [ ] T-test
- [ ] Z-test
- [x] Bayes theorem
- [ ] Confidence interval

Explanation: Bayes theorem is used in Bayesian statistics to update our prior beliefs about a hypothesis based on new data or evidence, allowing us to make more accurate probability predictions.

6. A confidence interval is calculated for a sample mean with a sample size of 100 and a standard deviation of 10. The 95% confidence interval is found to be between 25 and 30. What is the margin of error?

- ○ 2.5
- ◉ 5
- ○ 7.5
- ○ 10

Explanation: The margin of error is calculated as half the width of the confidence interval, which is (30-25)/2 = 2.5. Therefore, the margin of error is 5.

7. A researcher wants to compare the mean height of two different groups of plants. One group has a sample size of 15 and the other group has a sample size of 20. The population variance is known to be 9. Which test should the researcher use to compare the means?

- ○ T-test
- ◉ Z-test
- ○ Both tests can be used
- ○ Neither test can be used

Explanation: When the population variance is known and the sample sizes are sufficiently large, a z-test can be used to compare means of two independent groups. In this case, the population variance is known and the sample sizes are not very small, so a z-test would be appropriate.

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