GENERAL

ap statistics chapter 6 test answers

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Introduction

Welcome to your one stop guide for mastering AP Statistics Chapter 6, the chapter that focuses on hypothesis testing for population proportions. Whether you're a high school student preparing for the AP exam or a teacher looking for supplemental resources, this article will walk you through the essential concepts, provide step by step test answers, and share practical tips to boost your confidence. By the end, you'll not only know how to solve the problems but also understand the reasoning behind each decision.

Why Chapter 6 Matters in the AP Exam

Chapter 6 is a cornerstone of the AP Statistics curriculum. The exam frequently asks students to:

- Determine the appropriate test (z test for proportions, chi square goodness of fit, etc.).
- Compute test statistics and p values accurately.
- Interpret results in the context of real world scenarios.
- Make decisions about null and alternative hypotheses.

Because the exam rewards both conceptual understanding and procedural fluency, having a clear grasp of the test answers for common question types can be a game changer.

Key Concepts Covered in Chapter 6

1. Population Proportion vs. Sample Proportion

The population proportion, denoted **p**, is the unknown true proportion of a characteristic in the entire population. The sample proportion, **p̂**, is the observed proportion in a random sample. The difference between them is the core of hypothesis testing.

2. Null and Alternative Hypotheses

In proportion tests, the null hypothesis typically states that the population proportion equals a specific value (**p = p₀**). The alternative can be:

- Two tailed: p "` p €
- Left tailed: p
- Right tailed: p > p €

3. Standard Error and the Normal Approximation

The standard error of the sample proportion under the null hypothesis is:

SE = sqrt(p €(1 - p €) / n)\n\nWhen the sample size is large enough (np € "e 10 and n(1 - p €) "e 10), the sampling distribution of **p̂** can be approximated by a normal distribution.

4. Test Statistic and p Value

The z test statistic is calculated as:

z = (p0 - p €) / SE\n\nUsing the standard normal table or a calculator, convert the z value to a p value. Compare the

p value to the significance level (; Â 6öÖÖöæÇ’ ã R’ Fò FV6–FR v†WF†W" Fò &V¦V7B F†R àull hypothesis.

5. Confidence Intervals vs. Hypothesis Tests

Although both involve the same formulas, confidence intervals provide a range of plausible values for **p**, whereas hypothesis tests ask a yes/no question about a specific value. Understanding the relationship helps avoid common pitfalls.

Step by Step Guide to Solving Chapter 6 Problems

Step 1: Identify the Hypotheses

Read the question carefully. Determine what the problem is asking—whether it’s testing if a proportion is greater than, less than, or different from a given value.

Step 2: Verify the Normal Approximation

Check that both np € and n(1 - p €) are at least 10. If not, use a binomial test or exact test (e.g., Fisher’s exact test) instead of the normal approximation.

Step 3: Compute the Test Statistic

Plug the numbers into the z formula. Remember to use the hypothesized proportion (p €), not the sample proportion, in the standard error.

Step 4: Find the p Value

Use a standard normal table, a calculator, or software to translate the z value into a p value. For two tailed tests, double the one tailed p value.

Step 5: Make a Decision

Compare the p value to ; à If p "d ; Â &V¦V7B F†R àull hypothesis. Otherwise, fail to reject it.

Step 6: State the Conclusion in Context

Translate the statistical decision back into plain English, referencing the real world scenario.

Sample Problem 1: Testing a Right Tailed Hypothesis

Question:A company claims that 70% of its customers are satisfied. In a random sample of 200 customers, 140 report satisfaction. Test the company’s claim at the 0.05 significance level.

Solution

1. Null hypothesis: p = 0.70.
2. Alternative hypothesis: p > 0.70.
3. Check normal approximation: np € = 200 × 0.70 = 140 "e 10, n(1 - p €) = 60 "e 10 !’ OK.
4. Compute SE: sqrt(0.70 × 0.30 / 200) = sqrt(0.21 / 200) "H sqrt(0.00105) "H 0.0324.
5. Compute z: (0.70 - 0.70) / 0.0324 = 0.
6. p value: For a right tailed test, p = 1 - :b*ƒ* ’ Ò ãRà
7. Decision: 0.5 > 0.05 !’ fail to reject the null hypothesis.
8. Conclusion: There isn’t enough evidence at the 5% level to support the claim that more than 70% of customers are satisfied.

Sample Problem 2: Two Tailed Test with a Small Sample

Question:A university claims that the proportion of first year students who graduate within four years is 0.80. In a sample of 25 students, 19 graduate on time. Test the claim at ; Ò ã à

Solution

1. Null: p = 0.80.
2. Alternative: p "` 0.80.
3. Check normal approximation: np € = 20, n(1 - p €) = 5 !’ n(1 - p €)
4. Use a binomial test instead. Compute the probability of observing 19 or more successes under p = 0.80 using the binomial distribution.
5. Using a calculator or software, the two tailed p value "H 0.039.
6. Decision: 0.039
7. Conclusion: There is insufficient evidence at the 1% level to claim that the proportion differs from 80%.

Common Mistakes and How to Avoid Them

1. Using the Sample Proportion in the Standard Error

Always use the hypothesized proportion (p €) when calculating SE. Using p0 inflates the SE and can lead to a wrong conclusion.

2. Ignoring the Normal Approximation Conditions

When np € or n(1 - p €) is below 10, the normal approximation is unreliable. Switch to exact tests in such cases.

3. Misinterpreting the p Value

A small p value does not prove the alternative hypothesis; it only indicates that the observed data are unlikely under the null hypothesis.

4. Forgetting the Direction of the Test

Ensure the tail direction matches the alternative hypothesis. A left tailed test uses the lower tail of the normal distribution.

Practice Questions with Answers

Question 1

A survey finds that 30 of 120 students prefer online learning. Test whether the true proportion of students who prefer online learning is 0.20 at ; Ò ã Rà

1. Null: p = 0.20.
2. Alternative: p "` 0.20.
3. np € = 24, n(1 - p €) = 96 !’ OK.
4. SE = sqrt(0.20 × 0.80 / 120) = sqrt(0.16 / 120) "H 0.0366.
5. z = (0.25 - 0.20) / 0.0366 "H 1.37.
6. p value "H 0.171.
7. Decision: Fail to reject.
8. Answer: There is no evidence that the proportion differs from 20%.

Question 2

A health study claims that 60% of smokers develop a certain condition. In a sample of 150 smokers, 90 develop the condition. Test the claim at ; Ò ã à

1. Null: p = 0.60.
2. Alternative: p "` 0.60.
3. np € = 90, n(1 - p €) = 60 !’ OK.
4. SE = sqrt(0.60 × 0.40 / 150) "H 0.0408.
5. z = (0.60 - 0.60) / 0.0408 = 0.
6. p value = 1.0.
7. Decision: Fail to reject.
8. Answer: The data do not support the claim that 60% develop the condition.

Using Software to Verify Your Answers

While manual calculations are essential for exam practice, software can double check your work. Below are quick commands for common tools:

- Excel: =NORM.S.DIST(z, TRUE) for p value.
- R: pnorm(z, lower.tail = FALSE) for one tailed right tailed test.
- Python (SciPy): scipy.stats.norm.sf(z).

Always interpret the output in the context of the question.

Tips for Exam Success

- Practice with real data sets: Use the AP Statistics textbook or online resources to find sample problems.
- Memorize the standard error formula for proportions to avoid calculation errors.
- Know when to use exact tests—especially with small sample sizes.
- Check your units: Ensure that proportions are expressed as decimals, not percentages.
- Time management: Allocate a few minutes for each problem; double check critical calculations.

Resources for Further Study

Baca Juga (Artikel Terkait)

• **advanced engineering electromagnetics solution manual edition hardcover by balanis constantine a published by wiley**
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