

chapter 7 ap statistics practice test answers

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Mastering Chapter 7 AP Statistics: A Complete Guide to Practice Test Answers

AP Statistics is a challenging course that demands a deep understanding of probability, inference, and data interpretation. Chapter 7, which focuses on **inference for categorical data** and **hypothesis testing for proportions**, is a pivotal part of the curriculum. Many students find themselves overwhelmed by the array of concepts, formulas, and test-taking strategies required to excel. Fortunately, a well-structured practice test, coupled with clear, detailed answers, can dramatically improve your confidence and performance.

In this article, we'll walk you through the essential ideas of Chapter 7, highlight common pitfalls, and provide you with a comprehensive set of practice test answers. We'll also share expert study techniques, explain how to interpret each answer, and give you actionable tips for turning practice into real exam success. Whether you're a freshman preparing for your first AP exam or a senior looking to fine-tune your skills, this guide will help you master Chapter 7 and boost your overall AP Statistics score.

What Chapter 7 Covers

Chapter 7 is all about making inferences about categorical data. It introduces the following core topics:

- One-Sample Tests for Proportions – comparing a sample proportion to a hypothesized population proportion.
- Two-Sample Tests for Proportions – comparing two independent proportions to determine if they differ significantly.
- Confidence Intervals for Proportions – estimating the range within which a population proportion likely falls.
- Chi-Square Tests for Goodness of Fit – assessing whether observed frequencies match expected frequencies.
- Chi-Square Tests for Independence – determining if two categorical variables are independent.
- Contingency Tables – organizing data for chi-square analysis.
- Assumptions and Conditions – ensuring the validity of tests.

Understanding these concepts is essential for tackling Chapter 7 questions on the AP exam, where you'll encounter both multiple choice and free response items that require quick, accurate calculations and clear explanations.

Key Concepts and Formulas

Below is a concise reference guide to the most frequently used formulas and terms. Keep this page handy while you study, and refer back whenever a question feels fuzzy.

One-Sample Test for Proportions

1. Test Statistic (z-score): $z = \frac{\hat{p} - p_0}{\sqrt{p_0(1-p_0)}} \sqrt{n}$
2. p_0 – hypothesized population proportion; n – sample size.

Two-Sample Test for Proportions

1. Pooled Proportion: $\hat{p} = \frac{p_1 + p_2}{2}$
2. Test Statistic: $z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\hat{p}(1-\hat{p})(1/n_1 + 1/n_2)}}$

Confidence Intervals for Proportions

1. Margin of Error (ME): $ME = z^* \times \sqrt{p_0(1 - p_0)/n}$
2. CI: $p_0 \pm \hat{P}$

Chi Square Test for Goodness of Fit

1. Chi Square Statistic: $\chi^2 = \sum [(O - E)^2 / E]$
2. Degrees of Freedom (df): $k - 1$, where k = number of categories.

Chi Square Test for Independence

1. Expected Frequency (E_{ij}): $(\text{Row Total} \times \text{Column Total}) / \text{Grand Total}$
2. Chi Square Statistic: same formula as goodness of fit, but summed over all cells.
3. Degrees of Freedom (df): $(r - 1)(c - 1)$, where r = number of rows, c = number of columns.

Common Mistakes in Chapter 7

Even experienced students can trip on subtle errors. Here are the most frequent mistakes, along with quick fixes:

- Ignoring the Normal Approximation Condition: For proportion tests, the rule of thumb is $np \geq 10$ and $n(1 - p) \geq 10$. Skipping this check can invalidate the test.
- Misreading the Hypothesis: Pay close attention to whether the alternative hypothesis is $=$, $>$, or $<$. The direction of the test determines whether you look up a one-tailed or two-tailed critical value.
- Using the Wrong Standard Error: In two-sample tests, you must use the pooled proportion. Mixing up the standard error formulas can lead to wrong z -scores.
- Miscalculating Expected Frequencies: In chi-square tests, expected counts must be derived from the product of row and column totals divided by the grand total. A common slip is to use observed counts instead.
- Overlooking the Continuity Correction: While not required for the AP exam, some instructors recommend applying a continuity correction for small samples. Be sure to follow the instructor's guidelines.
- Misinterpreting the P-Value: A p -value tells you the probability of observing data as extreme as yours if the null hypothesis is true. It is not the probability that the null hypothesis is true.

Using Practice Test Answers Effectively

Answers alone won't make you a master. The real value lies in understanding **why** each answer is correct. Here's how to maximize the benefit of practice test answers:

1. Work the Problem First: Attempt the question without looking at the answer. This primes your brain to identify where you went wrong.
2. Compare Your Work to the Answer Key: Highlight discrepancies and note the exact step where you diverged.
3. Re-derive the Correct Solution: Write out the full solution again, ensuring you understand each calculation and assumption.
4. Summarize the Key Insight: Write a one-sentence takeaway that captures the core concept (e.g., "For a one-sample proportion test, the standard error uses the hypothesized proportion.").
5. Apply the Insight to New Problems: Create or find a fresh question that requires the same concept and solve it.
6. Record Mistakes in a Master List: Maintain a running list of common errors so you can review them before the exam.

Sample Chapter 7 Practice Test Questions

Below are ten representative questions that reflect the difficulty and style of the AP Statistics exam. Each question

is followed by a detailed answer and explanation.

Question 1: One Sample Proportion Test

A random sample of 200 voters in a city shows that 112 favor a new public transportation policy. Test at the 5% significance level whether the true proportion of voters who favor the policy is greater than 50%.

Answer 1

1. State the Hypotheses

$H_0: p = 0.50$ (the true proportion is 50%)

2. $H_a: p > 0.50$ (the true proportion is greater than 50%)

- $np = 200 \times 0.50 = 100 \geq 10$
- $n(1 - p) = 200 \times 0.50 = 100 \geq 10$
- $p_0 = 0.50$
- $SE = \sqrt{p(1 - p)/n} = \sqrt{0.5 \times 0.5 / 200} = \sqrt{0.00125} = 0.03536$
- $z = (0.56 - 0.50) / 0.03536 = 1.70$
- ; $\hat{p} = 0.56$ $F_{0.95, 199} = 1.645$ $\hat{p} > F_{0.95, 199}$
- $z = 1.70 > 1.645$! Reject H_0 .
- There is sufficient evidence at the 5% level to conclude that more than half of the city's voters favor the policy.

Question 2: Two Sample Proportion Test

In a study comparing two teaching methods, 30 students in Group A (traditional lecture) had 18 correct answers on a test, while 35 students in Group B (interactive learning) had 27 correct answers. Test at the 1% significance level whether the proportion of correct answers differs between the two groups.

Answer 2

1. State the Hypotheses

$H_0: p_1 = p_2$, (no difference)

2. $H_a: p_1 \neq p_2$, (difference exists)

- $n_1 p_1 = 30 \times 0.6 = 18 \geq 10$, &R
- $n_1(1 - p_1) = 30 \times 0.4 = 12 \geq 10$ &R
- $n_2 p_2 = 35 \times 0.7714 = 27 \geq 10$, &R
- $n_2(1 - p_2) = 35 \times 0.2286 = 8 \geq 10$, &P
- $p_1 = 0.6$, $p_2 = 0.7714$ $z = 2.38$ $z_{0.995} = 2.576$ $z < z_{0.995}$, �

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