GENERAL

ap statistics chapter 9 practice fr test testing a claim

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Unlocking AP Statistics Chapter /9: Mastering Practice FR Tests for Claim Testing Questions

When the AP Statistics exam arrives, many students feel the pressure of the free response (FR) section. Chapter 9, which covers hypothesis testing, is a cornerstone of that section. It's the gateway to answering questions about whether data support a claim, a skill that is not only essential for the test but also for real world data analysis. This guide dives deep into Chapter 9, offering a clear roadmap for mastering practice FR tests and testing a claim. By the end, you'll feel confident tackling any claim testing problem that pops up on the exam.

1. What Is Chapter /9 About?

Chapter /9 of the AP Statistics curriculum is dedicated to **hypothesis testing**. It teaches students how to formalize a claim, construct a null hypothesis (H €) and an alternative hypothesis (H •), choose the correct test statistic, and interpret the p value. The chapter also covers:

- One sample tests for means, proportions, and variances.
- Two sample tests for means and proportions.
- Non parametric tests such as the sign test and the Wilcoxon signed rank test.
- Goodness of fit tests and tests for independence.

These tools are the foundation for the FR questions that require students to explain the steps of a test, justify their choices, and interpret results in context.

2. The Anatomy of a Claim Testing FR Question

Most FR questions in the AP exam follow a predictable structure:

1. State the claim. Identify what the student is asked to test.
2. Formulate hypotheses. Write H € and H • in terms of the population parameter.
3. Select the appropriate test. Decide between z, t, chi square, or non parametric tests.
4. Compute the test statistic. Plug in sample data.
5. Determine the p value or critical value. Use tables or technology.
6. Make a decision. Reject or fail to reject H €.
7. Interpret the result. Explain in plain language.

Practice FR tests for "testing a claim" demand not only accurate calculations but also clear, logical explanations. The key is to weave the statistical procedure into a narrative that the examiners can follow.

3. Common Types of Claim Testing Problems

Below are the most frequent problem types you'll encounter in Chapter /9 practice FR tests:

- One sample mean tests. Example: "A company claims its new battery lasts 12 hours. Test the claim using a sample of 30 batteries."
- One sample proportion tests. Example: "A survey suggests 60% of students prefer online learning. Test this

claim."

- Two sample mean tests. Example: "Compare the average test scores of two teaching methods."
- Two sample proportion tests. Example: "Are the pass rates different between two schools?"
- Chi square goodness of fit tests. Example: "Does a die roll produce a uniform distribution?"
- Chi square tests for independence. Example: "Is there a relationship between gender and choice of major?"
- Non parametric tests. Example: "Use the sign test to evaluate if a new drug changes blood pressure."

Each type demands a slightly different approach, but the core logic remains the same.

4. Step by Step Guide to Solving Practice FR Tests

Below is a practical workflow you can apply to any claim testing FR question.

4.1 Identify the Claim and Context

Read the question carefully. Highlight the population parameter in question (mean, proportion, variance). Note the direction of the claim (greater, less, not equal). This determines the alternative hypothesis.

4.2 Write the Hypotheses

Use precise mathematical notation:

- H €: ;Â Ò ¼ € (or p = p €, <;" Ò Ã² €, etc.)
- H •: ;Â â ¼ €, ;À

State them in words as well, because the FR answer requires natural language explanation.

4.3 Choose the Test Statistic

Decide based on:

- Sample size (n > 30 !' normal approximation; n
- Population variance known or unknown.
- Data type (continuous vs. categorical).
- Assumptions (normality, independence).

Common choices:

- z test for large n or known <2à
- t test for small n with unknown <2à
- chi square for categorical data.
- Wilcoxon or sign test for non normal data.

4.4 Compute the Test Statistic

Insert the sample values into the formula. For a one sample t test, for example:

t = (x0B b ¼ €) / (s / " n)

Ensure you use the correct degrees of freedom (df = n – 1).

4.5 Find the p Value or Critical Value

Use technology (graphing calculator, spreadsheet) or tables. For a two tailed test, double the tail probability. If the question specifies ; Ò ã RÂ 6ö× &R F†R `alue to 0.05.

4.6 Make a Decision

Rule of thumb:

- If p value "d ; " &V¦V7B , à
- If p value > ; " `ail to reject H €.

Write this decision clearly in your answer.

4.7 Interpret the Result

Translate the statistical decision back to the real world context. For instance:

“Based on the sample data, we reject the claim that the new battery lasts 12 hours at the 5% significance level. Therefore, there is insufficient evidence to support the company’s claim.”

Be concise but thorough.

5. Common Pitfalls and How to Avoid Them

Even experienced students stumble on these errors in Chapter /9 practice FR tests.

- Misidentifying the alternative hypothesis. Always align H • with the claim’s direction.
- Using the wrong test statistic. Double check sample size, variance knowledge, and data type.
- Ignoring assumptions. If normality is questionable, consider a non parametric test.
- Failing to state the decision in words. The exam expects a narrative explanation.
- Incorrect p value calculation. Verify tail direction and significance level.
- Overlooking the degrees of freedom. This affects critical values for t tests.

6. Sample Practice FR Questions and Detailed Solutions

6.1 One Sample Mean Test

Question:A factory claims that the average weight of its cereal boxes is 500 g. A random sample of 25 boxes has a mean weight of 495 /g and a standard deviation of 8 /g. Test the factory’s claim at the 0.05 significance level.

Solution:

1. Claim: ;Â Ò S örà
2. Hypotheses: H €: ;Â Ò S Â , ;Â & S à
3. Test: t test (n
4. Test statistic: t = (495 – 500) / (8 / " 25) = –5 / (1.6) = –3.125.
5. Degrees of freedom: df = 24.
6. p value: 2 × P(t "d –3.125) "H 2 × 0.002 = 0.004.
7. Decision: 0.004
8. Interpretation: There is strong evidence that the average weight is less than 500 /g, contradicting the factory’s claim.

6.2 Two Sample Proportion Test

Question: School A reports that 70% of its students pass the math exam. School B reports 65% pass. In a random sample of 200 students from each school, 140 from A and 130 from B passed. Test whether the pass rates differ at ; = 0.01.

Solution:

1. Claim: p • = p ,.
2. Hypotheses: H €: p • = p ,, H •: p • "` p ,.
3. Test: Two sample z test for proportions.

4. Pooled proportion: p0" Ò ƒ C ² 3 ’ ò ƒ# ²# ’ Ò #s ò C Ò ãcsRà
5. Standard error: SE = " [p0"ƒ b)(1/200 + 1/200)] = " [0.675·0.325·0.01] "H 0.046.
6. Test statistic: z = (0.70 – 0.65) / 0.046 "H 1.087.
7. p value: 2 × P(Z > 1.087) "H 2 × 0.138 = 0.276.
8. Decision: 0.276 > 0.01 !’ Fail to reject H €.
9. Interpretation: There is no significant difference between the pass rates of the two schools.

6.3 Chi Square Test for Independence

Question:A study examines the relationship between gender (male, female) and preference for a new product (like, dislike). The observed counts are:

- Male: 120 like, 80 dislike.
- Female: 150 like, 50 dislike.

Test the independence of gender and preference at ; Ò ã Rà

Solution:

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