GENERAL

ap statistics chapter 2 case closed answers

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Introduction

Preparing for the AP Statistics exam can feel like navigating a maze, especially when you hit a chapter that demands a solid grasp of both theory and practice. Chapter 2 of the AP Statistics curriculum—titled *Case Closed*—is often cited as a turning point for many students. It introduces the concept of hypothesis testing, a cornerstone of statistical inference, and sets the stage for the more advanced topics that follow. In this comprehensive guide, we'll walk through the essential ideas, common pitfalls, and step by step solutions that will help you master the **AP Statistics Chapter 2 case closed answers** and boost your confidence on test day.

What Is Chapter 2 About?

While the first chapter focuses on data collection and descriptive statistics, *Case Closed*dives into the world of hypothesis testing. You'll learn how to formulate null and alternative hypotheses, select appropriate test statistics, and interpret p values. The chapter also covers:

- One sample and two sample tests for means and proportions
- The concept of statistical significance and error types
- Confidence intervals as a tool for inference
- Practical applications such as testing whether a new drug is effective or whether a manufacturing process meets quality standards

Key Concepts You'll Need to Master

1. Null and Alternative Hypotheses

The null hypothesis (H €) represents a statement of no effect or no difference. The alternative hypothesis (H • or H •) posits that an effect or difference exists. Choosing the correct direction (one tailed vs. two tailed) is crucial.

2. Test Statistics and p Values

Depending on the sample size and data type, you'll use z tests, t tests, chi square tests, or exact tests. The p value tells you the probability of observing data as extreme as yours if the null hypothesis is true.

3. Significance Levels (; •

AP Statistics typically uses ; = 0.05, but the chapter often explores ; = 0.01 and ; = 0.10 to illustrate the impact of stricter or looser thresholds.

4. Confidence Intervals (CI)

CIs provide a range of plausible values for a population parameter. A 95% CI aligns with a two tailed test at ; Ò ã Rà

5. Error Types

Type I error (false positive) occurs when you reject H € incorrectly. Type II error (false negative) happens when you fail to reject a false H €.

Common Mistakes in Chapter 2

Understanding the pitfalls can save you from costly errors on the exam. Here are the top mistakes students often make:

- Misidentifying the test type—confusing a z test for a t test when the population standard deviation is unknown.
- Using the wrong significance level—assuming ; Ò ã R v—F†÷WB 6†V0king the question's instructions.
- Ignoring the directionality of the hypothesis—mislabeling a one tailed test as two tailed.
- Failing to account for the sample size when deciding between normal and chi square approximations.
- Overlooking the independence assumption—applying a test to data that aren't independent.
- Misinterpreting p values—treating them as the probability that H € is true.

Detailed Answers to Chapter 2 Case Closed Questions

Below we provide a selection of sample problems from the "Case Closed" section, complete with detailed explanations. These solutions illustrate the reasoning process and the algebraic steps you'll need to master.

Problem 1: Testing a Mean

Suppose a manufacturer claims that the mean lifetime of its lightbulbs is 1200 hours. A random sample of 36 bulbs has a mean of 1185 hours with a standard deviation of 80 hours. Test the manufacturer's claim at ; Ò ã Rà

1. State the hypotheses:\\n\\nH €: ;Â Ò #
2. H •: ;Â & # ‡Gpo tailed test)

z = (x0B b ¼ €) / (s / " n) = (1185 – 1200) / (80 / " 36) = (–15) / (80 / 6) = (–15) / (13.33) "H –1.125

Problem 2: Testing a Proportion

A survey finds that 42% of 250 students favor a new cafeteria menu. Test at ; = 0.01 whether the true proportion differs from 50%.

1. Hypotheses:\\n\\nH €: p = 0.50
2. H •: p "` 0.50

Problem 3: Confidence Interval for a Mean

Using the data from Problem 1, construct a 95% confidence interval for the true mean lifetime.

1. Formula: CI = x0B ¢¢ ‡2 ò !¦â'à For 95% CI, z* = 1.96.
2. Compute margin of error: ME = 1.96 * (80 / 6) "H 1.96 * 13.33 "H 26.13.
3. Interval: 1185 ± 26.13 !' (1158.87, 1211.13).

Step by Step Problem Solving Strategies

Mastering AP Statistics Chapter 2 hinges on a systematic approach. Below is a proven framework that aligns with the exam's expectations.

1. Read Carefully

Identify the type of test (mean vs. proportion), sample size, and whether the test is one tailed or two tailed. Look for clues like "test at ; Ò ã @ or "does the new drug improve recovery rates?"

2. Translate the Problem into Statistical Language

Convert everyday statements into formal hypotheses. For example, "does the new drug help?" becomes H €: ;À = ;Â vs. H •: ;Â & ¼ €.

3. Choose the Correct Test Statistic

- Large sample (n"e30) with known <2 " ¢ FW7Bà
- Large sample with unknown <2 " B FW7Bà
- Small sample (n
- Proportions !’ z test for proportions.
- Chi square tests for categorical data.

4. Compute the Test Statistic

Use the appropriate formula, plug in the numbers, and simplify carefully.

5. Find the p value (or critical value)

Use statistical tables, a calculator, or a smartphone app. Remember to double the one tailed p value for a two tailed test.

6. Make a Decision

Compare the p value to ; à If p "d ; À reject H €; otherwise, fail to reject H €. Alternatively, compare the test statistic to the critical value.

7. Interpret the Result

Translate your statistical conclusion back into the context of the problem. State whether there is evidence to support the alternative hypothesis and what that means practically.

Practice Problems and Solutions

Below are ten additional practice questions designed to reinforce your understanding of Chapter 2 concepts. Each problem includes a concise answer and a brief explanation.

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