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# 2001 Ap Stats Frq

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## Understanding the 2001 AP Stats FRQ: A Comprehensive Review for Students and Educators

The Advanced Placement Statistics examination has long been a benchmark for high school students aiming to demonstrate college-level proficiency in statistical reasoning. Among the many past exams, the **2001 AP Stats FRQ**(Free Response Questions) holds a special place in the history of the assessment. It represents a pivotal year in the evolution of the AP Statistics curriculum, challenging students with real-world data sets and multi-step inferential reasoning. In this article, we will dissect the 2001 AP Stats FRQ, explore each question type, provide solution strategies, and discuss why this particular exam remains a valuable study resource for modern test-takers.

## The Structure of the 2001 AP Statistics Free Response Section

The free response section of the 2001 AP Statistics exam consisted of six questions: five short-answer or multi-part problems and one investigative task. The total time allotted was 90 minutes, and each question was weighted equally. The 2001 AP Stats FRQ covered core topics such as **descriptive statistics**, **probability distributions**, **sampling distributions**, **confidence intervals**, **hypothesis testing**, and **experimental design** . Unlike some later exams, the 2001 test placed a strong emphasis on interpretation and communication of statistical results, rather than mere computation.

### Overview of Question Topics

- Question 1: Probability and conditional probability using a two-way table context.
- Question 2: Normal distribution and the use of z-scores to compare performance.
- Question 3: Experimental design – blocking and randomization in a medical study.
- Question 4: Confidence interval for a population proportion, including interpretation.
- Question 5: Hypothesis test for the difference of two means (independent samples).
- Question 6 (Investigative Task): A multi-part exploration of least squares regression and residual analysis.

This blend of topics makes the *2001 AP Stats FRQ*a comprehensive diagnostic tool for students preparing for any AP Statistics exam. Every major inference procedure is represented, and the investigative task demands the synthesis of multiple concepts.

## Deep Dive into Key Questions from the 2001 Exam

### Question 1: Two-Way Tables and Conditional Probability

The first question in the 2001 AP Stats FRQ presented a contingency table summarizing survey responses about television viewing habits. Students were asked to calculate marginal and conditional probabilities, such as the probability that a randomly selected viewer is a teenager given that they watch more than 5 hours per day. This question tested the student's ability to read a table correctly and apply the fundamental counting

principle. The key to success was careful reading: many students lost points by misidentifying the denominator for the conditional probability. Educators often use this question to emphasize the difference between $P(A|B)$ and $P(B|A)$.

**Solution strategy:** Identify the total number of individuals in the condition group (the given event) and then count the number in that group that also satisfy the other event. Express as a simplified fraction or decimal.

### Question 2: Normal Distribution and Z-Scores

Question 2 required students to standardize scores from two different exams to compare student performance. It gave the mean and standard deviation for each test and asked which score was higher relative to the class. This is a classic application of the normal distribution and z-scores. The 2001 AP Stats FRQ cleverly added a twist: the student had taken two different tests, and the question asked for the probability that a randomly selected student would have a score higher than the given student on the second test. This required using the complement rule and the empirical rule or a z-table.

**Takeaway:** Understanding the standard normal distribution and the interpretation of z-scores is essential. The 2001 question reinforces that a z-score is a measure of relative standing, not an absolute measure of performance.

### Question 3: Experimental Design and Blocking

Perhaps the most discussed question in the 2001 AP Stats FRQ is the third one, which involved designing an experiment to test a new cold medicine. The setting involved a comparison of a new drug versus a placebo, with the need to control for age and gender. Students were asked to propose a design using blocking. The correct approach was to block by gender (or by age group) and then randomly assign treatments within each block. The question penalized simplistic designs that ignored confounding variables. This query remains a classic example of how AP Statistics tests the core principles of **randomized comparative experiments**.

**Common mistake:** Students often suggested completely randomized designs without blocking, which would fail to account for known sources of variation. The 2001 FRQ made it clear that good experimental design is as important as the analysis itself.

## Detailed Analysis of Questions 4, 5, and the Investigative Task

### Question 4: Confidence Interval for a Population Proportion

Question 4 gave a sample of 500 voters and the number supporting a candidate. Students had to construct a 95% confidence interval for the population proportion and interpret it. The 2001 AP Stats FRQ expected students to verify the conditions (random sample, large sample size, independence) and then compute the interval using the formula $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$. Interpretation was critical – many students incorrectly said "95% of voters fall in this interval" instead of "we are 95% confident that the true proportion lies between these values."

### Question 5: Hypothesis Test for Difference of Two Means

The fifth question compared the mean scores of two groups of students taught by different methods. This was a two-sample *t*-test. Students were required to state the hypotheses, check conditions (independent samples, approximately normal distributions, equal variances could be assumed or use Welch's *t*), compute the test statistic and p-value, and draw a conclusion in context. The 2001 exam stressed the importance of verifying that the samples were independent and that the sample sizes were large enough to justify the use of the *t*-distribution. The conclusion had to be linked back to the teaching methods, not just a generic "reject the null."

### Question 6: Investigative Task – Regression and Residuals

The investigative task in the 2001 AP Stats FRQ was a comprehensive exercise in simple linear regression. Students were given a scatterplot and a computer output of a regression of price on size for houses. They had

to interpret the slope, the intercept, and the coefficient of determination. Then they were asked to compute a predicted value and the residual for a specific house. Finally, they had to explain what the residual plot indicated about the appropriateness of the linear model. This task assessed a range of skills: reading output, performing calculations, and evaluating model fit. The residual plot showed a curved pattern, so students had to conclude that a linear model might not be appropriate – a key insight for understanding.

**Important lesson:** The 2001 investigative task reinforces that residuals are not just leftovers – they are diagnostic tools. The ability to interpret residual patterns is a high-level skill that distinguishes top-scoring students.

## Why the 2001 AP Stats FRQ Remains Relevant Today

Even though the exam format has evolved (for instance, the number of questions and the inclusion of multiple choice have changed over the years), the 2001 AP Stats FRQ is still studied by students and teachers. There are several reasons for its enduring value:

- Conceptual depth: The questions require full-sentence interpretations, not just numerical answers. This mirrors the current emphasis on statistical communication in the College Board rubrics.
- Real-world contexts: The scenarios – from cold medicine trials to housing prices – are relatable and help students see the practical side of statistics.
- Balance of difficulty: The 2001 exam includes both straightforward probability problems and complex inferential reasoning, making it an excellent practice set for students at various skill levels.
- Teaching tool: Many educators use the 2001 FRQs as in-class exercises to illustrate common pitfalls, such as confusing correlation with causation or misinterpreting confidence intervals.

Moreover, the **2001 AP Stats FRQ** is readily available on the College Board website and in many review books. Its reputation as a fair but challenging exam makes it a favorite for timed practice sessions.

## Tips for Students Using the 2001 FRQs for Preparation

### Read the Entire Question Before Starting

One of the most common errors students make when encountering the *2001 AP Stats FRQ* is jumping into calculations without reading the entire prompt. Many questions have multiple parts that build on one another. For instance, Question 6 requires you to first predict a value and then use that prediction to compute a residual. If you misread the first part, the rest will be incorrect.

### Write Complete Sentences for Interpretation

The rubrics for the 2001 exam (and subsequent AP Stats exams) heavily reward clear communication. Instead of writing "it's between 0.4 and 0.5," write "We are 95% confident that the true proportion of voters favoring the candidate is between 0.42 and 0.48." Practice this skill by writing out your answers as if for a non-statistical audience.

### Check Conditions Every Time

Both for confidence intervals and hypothesis tests, the 2001 AP Stats FRQ expects you to verify assumptions. For example, in Question 4, you must state that the sample is random and that $np_0'$ and $np_0''$ are both at least 10. In Question 5, you should mention that the two samples are independent and that the population distributions are approximately normal (or that the sample sizes are large).

### Practice the Investigative Task

The Investigative Task (Question 6) in 2001 is a model for the type of synthesis question that appears on every AP Stats exam. It requires you to integrate regression, residual analysis, and prediction in a single coherent

response. To excel, practice interpreting all parts of a regression output – R-squared, slope, intercept, standard error – and connecting them to the context.

## Common Misconceptions Revealed by the 2001 FRQ

The 2001 AP Stats FRQ also highlights several persistent misunderstandings among students:

- Misinterpreting p-values: In Question 5, many students wrote "the probability that the null hypothesis is true is 0.03," rather than the correct interpretation: "If the null hypothesis were true, the probability of obtaining a test statistic as extreme as, or more extreme than, the observed one is 0.03."
- Confusing blocking with stratification: In Question 3, students sometimes proposed stratifying the sample rather than blocking in the experimental design. Blocking is a design technique for experiments; stratification is for surveys.
- Ignoring the condition of independence: In Question 1, students often forgot that the events were not independent, leading to incorrect multiplication of probabilities.
- Over-reliance on calculators: The 2001 exam allowed graphing calculators, but students still had to show their work. Simply writing "2-sample t-test gave p=0.03" without showing the formula or the test statistic earned no credit.

## How to Access and Use the 2001 AP Stats FRQ

You can find the original 2001 AP Stats FRQ, along with scoring guidelines and sample student responses, on the College Board's official AP Central website. These materials are invaluable for self-study. Use the scoring guidelines to see how points are awarded for each step – this teaches you what the examiners consider most important. Many teachers also post annotated versions online with commentary about typical student errors. The 2001 AP Stats FRQ is often included in compilation books such as "AP Statistics: Multiple Choice and Free Response Questions" and "5 Steps to a 5."

## Conclusion

The 2001 AP Stats FRQ is more than an archival exam – it is a teaching masterpiece. Its questions are carefully designed to test not only computational accuracy but also statistical thinking and communication.

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