AP Statistics Final Project

Overview

The final requirement for this course is the completion of a project that demonstrates your understanding of the major concepts of AP Statistics. Your project must start with an interesting and meaningful question; use a good design for data collection; summarize the data visually, numerically, and verbally; use the data to make appropriate inferences; and reach sound conclusions about the original question. You've learned a lot this year. Now it's time to show off! You may work by yourself or with one other person. **Project is due and presentations will take place in class on May 22nd, which is the seniors last day of class. This project is worth 100 test points and you have the opportunity to earn extra credit with the wow factor.**

Requirements

1. Choose a good question to investigate. You must get approval on your topic. **Topic approvals are due by the end of the period on Tuesday May 7th.**
2. Design an appropriate study or experiment.
3. Collect good data; they may come from an **unbiased** survey. You will not be surveying other classrooms. You must do the survey on your own before school, at lunch, or after school. You can also collect data from an observational study, experiment, or other sources such as publications or the internet.
4. Summarize your data using appropriate graphical displays, summary statistics, and verbal descriptions.
5. Make inferences based on your data. **You must have a confidence interval and a hypothesis test (or regression analysis).**
6. State your conclusions
7. Present your research to the class with a poster board, etc. (**on May 22nd**)
8. Submit a complete written report using statistical language. Report must be typed. **Due on May 22nd**.

Evaluation

Grades will be based upon your research question, your design, the proper application of statistical concepts and methods, your class presentation and your written report. During these last few weeks of school, you will be expected to use class time to collect data and work on this project. You are on your honor to use this class time productively. Failure to do so will lower your final grade. **Remember that this is worth 100 TEST POINTS, so if you are not working on this in class you will be losing test points.**

Project Advice

1. Think of an interesting question or an issue we care about. Frankly speaking, whether the pizza in the cafeteria is good is not a question that will get approved.
2. Create a good design, free of bias, randomized, that will produce useful data. Remember that controlling an experiment is often easier than sampling.
3. Give yourself adequate time to collect and analyze the data. The due dates arrive faster than you think they will.
4. Make clear summaries – graphical, numerical, and verbal.
5. Produce a sophisticated statistical analysis.
6. Reach statistically justifiable conclusions about your original question.
7. Make a clear, thorough, and interesting presentation to the class.
8. Submit a complete report.

Some Ideas

- Do after school jobs or participation in sports affect grades?
- Can we predict height or weight from shoe size?
- Are smokers less likely to wear seatbelts?
- Which grocery store or drug store has the lowest prices?
- Do males get higher math SAT or AMC scores than females?
- Are females equally likely to enroll in advanced math, science, or computer courses?
- Do ninth graders study more or less than juniors or seniors?
- How much stronger is a person's dominant hand?
- Are lefties more coordinated with their right hands than righties with their lefts?
- Do people prefer coke or Pepsi?
- Can people tell the difference between national brands and store brands?
- Can people tell by taste whether soda comes from a plastic bottle, a glass bottle, or a can?
- Does mail arrive faster with zip codes?
- Does ESP or astrology actually work?
- Are reaction times faster for males or females? Athletes/non-athletes? Right/left hand?
- Are homeruns, RBI, or batting averages good predictors of baseball salaries?
- Are NFL and NHL teams more likely to be able to come from behind in home games?
- What is the trend in swimming records? In college costs? In birth rates?

Written Report Example

Too many Ads

Is the proportion of advertisements in teen magazines greater than the proportion of advertisements in news magazines? While the advertisements in those magazines are quite different, there is reason to believe that there are more ads aimed at teens. The goal of this study was to determine whether the proportion of advertisements in these magazines was significantly different and there is a greater proportion of advertisements in teen magazines. Two samples were taken out of the population of the October, November, and December issues of Seventeen and the population of the first three issues of those months of Time magazine. Pages in the samples were randomly picked from the entire population of pages in those magazines. Only the pages that had at least a half page or more of advertisements were counted. Out of the 105 pages samples from Seventeen 61 pages were advertisements and 103 pages sampled from Time 47 were ads.

A large sample, one sided significance test for the difference in two proportions was used to examine whether the difference is statistically significant. The assumptions for this test were fulfilled. The two samples were independently selected simple random samples and the sample sizes are large (greater than 30). A significance level was set before the test was performed at .05. The p value for the test is .036, which is statistically significant at the .05 level. The sample was found to provide strong evidence to reject the null hypothesis and the proportion of advertisements in Seventeen is the same as the proportion of advertisements in Time. A 95% confidence interval was calculated to estimate the true population difference between the two proportions. The interval, (-.0101, .2594), says that if this study were repeated 100 times and 95% confidence intervals were made for each sample then about 95 of the 100 confidence intervals would contain the true population difference in the two proportions. The confidence interval for this study estimates that the proportion of ads in Seventeen is anywhere between 1% less and 26% greater than the proportion of advertisements in Time. This interval is very wide due to the small sample sizes. Both the significance test and confidence interval would be more accurate with larger samples.

There are a few weaknesses in this study. Time magazine is a weekly issue while Seventeen is only printed every month. This may have been a confounding variable in the study. To try to eliminate this bias the three issues from Time arrived at newsstands at the beginning of the months, the same time the monthly Seventeen were out. The size of the advertisements also may have affected the results. While most advertisements in Seventeen were full page ads most ads in Time were less than a page. The low power and the wide confidence interval both suggest that one cannot entirely rule out the null hypothesis as incorrect even though the sample is statistically significant at the .05 level. In conclusion, the sample is not practically significant. There is evidence to support the alternate hypothesis that the

proportion of advertisements in Seventeen is greater that the proportion of advertisements in time, but the difference is small in magnitude.

Rubric

Chose a good, interesting question to investigate	5
Designed a good study/experiment	15
Collected data and organized the data with graphical displays, summary statistics, and verbal descriptions	20
Performed a hypothesis test (or regression) and confidence interval	20
Presentation	20
Written Report	20