

Project Assignment for Statistics 301, Lectures 1, 2 and 6, Spring Semester, 2008

You must perform one or two of the three projects described below and submit a written report for each project you select. **If you perform two projects, one of them must be project 2.** The report must be submitted on paper; I will not accept electronic reports.

You may work alone or as a member of a team of three or fewer persons. If you work as a team, only one report per project should be submitted by a team (remember to include everyone's name on the report!) and all members of the team will receive the same grade. Neither my expectations for nor grading of reports is influenced by the size of the team, **except** that a team of two or more persons will receive a one-half point bonus, unless the bonus would result in a score larger than 18.0 points.

Please submit legible reports. For many of you, this will mean words typed, and "nonwords" (e.g. tables, figures, formulas, and computations) drawn by hand. Effective use of color and illustrations can greatly enhance a report.

The maximum score for each project is 18 points.

I have 432 students; thus, the possibility of 864 projects. Sometimes projects disappear. Some of those times, it is due to my negligence. In any event, you must keep a copy of your project in case the original is lost.

Project 1A. Due before 3:00 pm on Monday, March 10. Perform a balanced completely randomized design on 100 trials with a dichotomous response to investigate some issue. Explain why the issue interests you and describe how you randomized. Present and summarize the data using techniques discussed in the course. Choose an alternative for Fisher's test and explain your choice. Calculate two P-values for the data and alternative: use the standard normal curve with the continuity correction, and use the website to obtain the exact P-value. Compare your two P-values and comment. Your report should include a summary of what you have learned from your study.

Project 1B. Due before 3:00 pm on Monday, March 10. Perform a balanced completely randomized design on 50 persons with a dichotomous response to investigate some issue. Indicate how you obtained your subjects and why these particular persons are of interest to you. Explain why the issue interests you and describe how you randomized. Present and summarize the data using techniques discussed in the course. Choose an alternative for Fisher's test and explain your choice. Calculate two P-values for the data and alternative: use the standard normal curve with the continuity correction, and use the website to obtain the exact P-value. Compare your two P-values and comment. Your report should include a summary of what you have learned from your study.

Project 2. Due before 3:00 pm on Monday, April 14. Perform 100 dichotomous trials under "fixed conditions" related to an activity of interest to you. Exercises 6–14 on pages 177–178 of the text present summaries of studies of this type that were performed by other students. Your report should describe the activity, why it interests you, and why you are interested in the fixed conditions you study.

Note that if a success is extremely difficult or extremely easy to obtain, 100 trials are not likely to reveal much of interest. You will obtain more interesting data if you select conditions that make the probability of success on a trial be a number between 0.25 and 0.75.

- (a) Before you collect any data make a *point guess* of the value of p . (Point means single number. For example, if I were shooting free throws, before I collect data I would say, "My best guess is that $p = 0.58$.")

- (b) **Use the data from your 100 trials to investigate the validity of Assumptions 2 and 3 of Bernoulli trials, using the techniques presented in lecture for Chapter 5.** (Note: I put this in bold-face type because, historically, a large proportion of students have neglected to do this when told with regular-face type!) Your report must contain the time-order results of your 100 trials so that I can check your analysis.
- (c) On the assumption you have Bernoulli trials, find the 95 percent confidence interval for p . Is your point guess from part (a) in your CI? What does the CI tell you about the accuracy of your guess?
- (d) On the assumption you have Bernoulli trials, find the point prediction and 95 percent prediction interval for the number of successes in 100 future trials.
- (e) Perform the 100 additional trials and compare your results to your predictions from part (d).

Grading of Reports. A report will not receive full credit simply because it contains no errors. Reports will be graded on effort, creativity, report presentation (primarily clear writing), accuracy and appropriateness of analysis, and interpretation of results.

Very important, read this. Based on a problem that arose last semester, I want to make the following very clear.

1. If you share data with another individual/team, you will receive a score of 0 on your project.
2. If you use data from a report submitted previously by a student in any of my classes, you will receive a score of 0 on your project.
3. If you fabricate your data, you will receive a score of 0 on your project.

It is ok to replicate an earlier project. For example, many students have studied shooting free throws in basketball; it is acceptable for you to do it too. But it is wrong to use data collected by another or to fabricate your free throw data.

Apart from issues of integrity and honesty, here is my point: I assign these projects so that you can get the experience of doing a study and so that you have the possibility of seeing that Statistics might be useful in your life.

By the way, it is my judgment that will determine whether any of the forbidden actions listed has occurred. In particular, I don't need to prove it in any legal or statistical sense, but I will, of course, be willing to discuss the matter with you if you think I am mistaken.

Model projects are available on my webpage. Also click onto

Research Papers: > Papers on Statistical Education > Small Student . . . , pp. 3–9

for ideas for project topics.