

Project 7 - Hypothesis Testing

Statistics 401: Fall 2006

Due Monday, October 30

Turn in your solutions to this project in a typed report. When a problem requires calculations, do these calculations “by hand” and include this work in your report. Choose a significance level of $\alpha=.05$ if one is not given.

1. Do problem 10.4 on page 409.
2. Do problem 10.10 on page 410.
3. Do problem 10.16 on page 415.
4. Do problem 10.18 on page 415.
5. For the following tests of proportions, write out each of the six steps of this hypothesis test. Clearly write your hypotheses and show the calculation of the test statistic and p-value. Clearly indicate how you are checking assumptions, what decision you are making, and make clear your conclusion. Use R’s `prop.test` function to confirm the “by hand” calculations that you got and include the R code and R output in an Appendix in your report.
 - (a) Do problem 10.30 on page 427.
 - i. Who are the individuals in this study?
 - ii. What variable is being measured on each individual?
 - iii. Perform the test.
 - (b) Do problem 10.32 on page 427.
 - i. Who are the individuals in this study?
 - ii. What variable is being measured on each individual?
 - iii. If this study was a CRD, how must the study have been performed? Assume that patients taking the conventional leukemia treatment were in the study.
 - iv. Perform the test.
 - v. Assume that the sample was composed of volunteers and assume that this study is a CRD. What conclusions can you make? Address inference and cause-and-effect.
6. For the following tests of means, write out each of the six steps of this hypothesis test. Clearly write your hypotheses and show the calculation of the test statistic and p-value. Clearly indicate how you are checking assumptions, what decision you are making, and make clear your conclusion.
 - (a) Do problem 10.48 on page 438.
 - i. Who are the individuals in this study?
 - ii. What variable is being measured on each individual?
 - iii. Give the sample space for this variable.

- iv. Is the variable discrete or continuous? Explain.
 - v. Is this study an observational study or an experiment? Explain.
 - vi. Perform the test.
 - vii. Assume that the sample was random (as specified in the problem). Based on your answer to (v), what conclusions can you make? Address inference and cause-and-effect.
- (b) Do problem 10.58 on page 440. The data is on the CD which came with your textbook. Of course, you always type the data in like I did:

```
nitrate=c(7251,6871,9632,6866,9094,5849,8957,7978,7064,7494,7883,8178,
          7523,8724,7468)
```

- i. Even though we do not have a sample size over 30, we can still safely use a t -test. Use a histogram, which you need to include in your report, to explain why.
 - ii. Perform the test.
 - iii. Use R's `t.test` function to confirm the "by hand" calculations that you got and include the R code and R output in an Appendix in your report.
7. Do problem 10.60acde on page 448 (You already did (b). Skip (f) and (g).). You may make the sketch required in (d) by hand and turn it in with your report. *Hint for (e)*: See Example 10.17 on page 443.
8. For problem 10.60 on page 448, calculate the power of the test when $\mu = 153$.
9. Do problem 10.62 on page 449.
- (a) Use R's `prop.test` to do the test and include the R code and R output in the Appendix.
 - (b) *Hint*: See Example 10.18 on page 445.