Public Policy 529: PRACTICE Final Exam
Fall 2014

Instructions: Read each question carefully and be sure you answer every part of every question. **Show all your work.** If you have difficulty with a question early on, my advice is to skip to the next question and come back to the former when you have completed the other questions. Good luck!

1. MULTIPLE CHOICE. Which of the following are FALSE? Select ALL that apply. (5 points)

a. The t-distribution is appropriate for small sample significance tests, under certain assumptions.

b. The spread of the standard normal distribution depends on sample size.

c. It is not valid to use the t-distribution for large sample significance tests.

d. The t-distribution becomes narrower as the sample size increases.

e. The standard normal distribution and the t-distribution are nearly identical when the sample size is very large.

2. MULTIPLE CHOICE. Suppose a team of researchers wrote "An important public health question is whether singing to babies helps them fall asleep. To analyze this question, we randomly selected 100 mothers of newborn infants. We asked them two questions: "How many times a week do you sing to your baby?" and "How many hours each night does your baby sleep, on average?" Our research has found a Pearson's r of 0.10, indicating that there is very little correlation between mother singing and infant sleeping."

A newspaper report of the research said "Don't bother with lullabies – they're a waste of time." Which of the following are TRUE? Select ALL that apply. (4 points)

a. This Pearson's r value indicates a strong and statistically significant correlation.

b. This Pearson's r value indicates a positive correlation.

c. The researchers' conclusion is written appropriately as a correlation, assuming the relationship is linear and the sample is random.

d. The newspaper's report is a good causal summary of the researchers' finding, and representative of a good policy recommendation.

BONUS: Give one example to back up your answer to (d).

3. A hospital administrator wants to estimate the mean length of stay for all inpatients in that hospital. Based on a systematic random sample of 62 records of patients for the previous year, she reports that "The sample mean was 8.1. In repeated random samples of this size, the sample mean could be expected to fall within 2.3 of the true mean about 95% of the time."

i. Construct a 99% confidence interval for the mean. (5 points)

ii. The administrator decides that this 99% confidence interval is too wide, and she prefers one of only half this width. How large a sample size is needed? (3 points)

4. Suppose experts have argued the average personal debt per household in the United States would reach $8,500 in 2012. For a random sample of 65 households selected in 2012, $\bar{Y}$ = $13,800 and s = $8,162.

i. Calculate the 95% confidence interval for the level of debt. (5 points)

ii. Suppose we next conduct a two-sided significance test for H0: μ = $8,500. Based on the answer to part (a), which ONE of the following is true? (3 points)

a. If we conduct a significance test using alpha = 0.05, we will reject the null.

b. If we conduct a significance test using alpha = 0.10, we will fail to reject the null.

c. We know nothing about the outcome of a significance test from our calculations in part (a).

5. Researchers interviewed 1,715 graduate students about what year of school they were in, and also about whether they liked their degree program. When asked about whether they liked the degree program they were enrolled in, the students could answer “like,” “indifferent”, or “dislike.” The researchers published the following results, with one number blocked out.

	Program Satisfaction			
Year	like	indifferent	dislike	Total
First	305	455	435	1,195
Second	165	175	180	520
Total	470	630	615	1,715

Pearson chi2(2) = 7.3456 Pr = [redacted]

a. Calculate the p-value, based off this test statistic. An approximation is okay. Recall that df=(r-1)*(c-1). (3 points)

b. Interpret the p-value in one sentence. [You can get full credit even if your p-value is incorrect.] (3 points)

c. Name one limitation of the test the researchers used for this research question, in one sentence. (3 points)

6. A researcher wants to see if there is a difference in average temperature between Ice City and Snow City. The researcher measured the temperature in Ice City on 25 days and calculated a mean of 25 degrees and a standard deviation of 11 degrees. The researcher also measured the temperature in Snow City on 38 days and calculated a mean of 31 degrees and a standard deviation of 9 degrees.

i. Conduct a significance test to evaluate whether Ice City and Snow City have the same average temperature, using an alpha level of 0.05. Include all significance test steps (assumptions, hypotheses, test statistic, p-value or critical value, and conclusion). (8 points)

ii. In one or two sentences, explain your conclusion and interpret its relevance for the initial research question. What does your test tell you about average temperature in Ice City and Snow City? (3 points)