Lab 11a: CI for Proportions

Stat 131A, Fall 2018

Learning Objectives:

- Computing confidence intervals for population proportions.

General Instructions

- Write your solutions in an `Rmd` (R markdown) file.
- Name this file as `lab11a-first-last.Rmd`, where `first` and `last` are your first and last names (e.g. `lab11a-gaston-sanchez.Rmd`).
- Knit your `Rmd` file as an html document (default option).
- Submit your `Rmd` and `html` files to bCourses, in the corresponding lab assignment.

Problem 1

I would like to know the fraction of homes in Alameda County, California, that have assessed values of $700,000 or more. I take a simple random sample of size 600 from the Alameda County property tax records (somehow). The sample percentage of homes assessed at $700,000 or more is 6%.

An approximate 80% confidence interval for the percentage of homes assessed at $700,000 or more is from _____ to _____.

Problem 2

A random sample with replacement of size 15 was taken from a box of tickets. Each ticket in the box is numbered either zero or one. Three of the tickets in the sample are labeled "1" the rest are labeled "0".

a. The sample proportion is:

b. Is the sample size large enough to justify the use of the SD(box) to compute a confidence interval based on the normal distribution?

Problem 3

The owner of a Mexican restaurant plans to change the menu in her restaurant, which specializes in quesadillas. She is trying to decide whether or not to offer *huitlacoche* (i.e. corn

mushroom) on the new menu. Each day for a month, she picks people at random as they come into the restaurant, and asks them whether they would order huitlacoche quesadillas if they were offered. On busy days, she picks more people; on quiet days, she picks fewer people. Suppose that in effect she has a simple random sample of 140 people who eat at her restaurant. Suppose further that the number of diners is much much larger than the sample. In the sample, 90 say they would order huitlacoche quesadillas if they were offered.

a. The sample proportion of diners who say they would order huitlacoche quesadillas is:

b. The bootstrap estimate of the population standard deviation is

c. A 88% confidence interval for the percentage of diners who would say they would order huitlacoche quesadillas among the population of people who eat at that restaurant would go from _____ to _____.

Problem 4

A utility company serves 50,000 households. As part of a survey of customer behavior, they take a simple random sample of 750 of these households. Out of the 750 households in the survey, 451 have computers. If possible, find a 99.7%-confidence interval for the proportion of all 50,000 households with computers. If this is not possible, explain why not.

Problem 5

(Continues from previous question) Out of the 750 households in the survey, 749 have at least one television set. If possible, find a 95%-confidence interval for the proportion of all 50,000 households with at least one television set. If this is not possible, explain why not.

Problem 6

The National Vital Statistics Reports for November 2011 states that U.S. Cesarean delivery rate for 2010 was about 32.8%. Cesarean delivery is also called a "C-section." It means the baby is not delivered in the normal way. The baby is surgically removed through an incision in the mother's abdomen and uterus. Suppose this year a random sample of 100 births has 41 that are C-sections.

Use the estimate from the NVS Report for 2011 and the result from this year's random sample to estimate the U.S. Cesarean delivery rate for this year with 95% confidence. (Be sure to check that a normal model is appropriate.)

Problem 7

Harris Interactive conducted a poll of American adults in August of 2011 to study the use of online medical information. Of the 1,019 randomly chosen adults, 60% had used the Internet

within the past month to obtain medical information. Use the results of this survey to create an approximate 95% confidence interval estimate for the percentage of all American adults who have used the Internet to obtain medical information in the past month.

Problem 8

Suppose we take a survey and use the sample proportion to calculate a confidence interval. Which level of confidence gives the confidence interval with the largest margin of error? 90%, 95%, and 99%?

    a. The 90% confidence interval will have the largest margin of error.

    b. The 95% confidence interval will have the largest margin of error.

    c. The 99% confidence interval will have the largest margin of error.

    d. It is impossible to tell which interval will have the largest margin of error.

Problem 9

Statistics students surveyed 135 students at a given ommunity college. From their data we are 95% confident that between 44.7% and 61.9% of all students are female. The students realize that this interval contains a large margin of error. What can they do to make a narrower interval?

    a. Survey more students.

    b. Use a 99% confidence level.

    c. Both (a) and (b).

    d. None of the above.

Problem 10

On September 25, 2011 Michael Vick, the quarterback for the Philadelphia Eagles broke his non-throwing hand in a football game against the New York Giants. ESPN then posted a poll on their website. The poll asked viewers to predict which team would win the NFC East Division. The Eagles play in the NFC East Division. By 4:15 pm, 914 fans had voted. 25% of them thought the Eagles would still win the division. What can we conclude from a 95% confidence interval about the opinions of ESPN viewers?

Problem 11

We survey a random sample of American River College students and ask if they drink coffee on a regular basis. The 90% confidence interval for the proportion of all American River

College students who drink coffee on a regular basis is (0.262, 0.438). What will be true about the 95% confidence interval for these data?

a. The 95% confidence interval is narrower than the 90% confidence interval.

b. The 95% confidence interval is wider than the 90% confidence interval.

c. The two intervals will have the same width.

d. It is impossible to say which interval will be wider.