Homework №9

Math 107, Spring 2016 Due: May 10 by 4:00 pm

Problem 1

The General Social Survey[1] (GSS) is a sociological survey used to collect data on demographic characteristics and attitudes of residents of the United States. In 2010, the survey collected responses from 1,154 US residents. The survey is conducted face-to-face with an in-person interview of a randomly selected sample of adults. One of the questions on the survey is "After an average work day, about how many hours do you have to relax or pursue activities that you enjoy?" A 95% confidence interval from the 2010 GSS survey is 3.53 to 3.83 hours.

(a) Provide an interpretation of this interval within the context of the problem.

(b) In this context, what does it mean to be 95% confident?

(c) Suppose the researchers think a 90% confidence level would be more appropriate for this interval. Will this new interval be narrower or wider than the 95% confidence interval?

(d) If a new survey asking the same questions was to be done with 500 Americans, would the standard error of the estimate most likely be larger, smaller, or about the same?

Problem 2

A poll conducted in 2013 found that 52% (383) of 736 randomly selected U.S. adult Twitter users get at least some news on Twitter.[2] The data are available in the file `twitternews.csv` on the course webpage.

(a) Use R to create a bootstrap distribution of the sample proportion consisting of 1000 simulations. Create a histogram of the bootstrap distribution. Include this plot in your homework submission along with the R code you used to generate it.

(b) Use R to calculate the bootstrap standard error of the sample proportion.

(c) Using the plug-in method, calculate a 95% bootstrap confidence interval for the proportion of U.S. adult Twitter users get at least some news on Twitter.

(d) Provide an interpretation of your interval from the previous part within the context of the problem.

Problem 3

The data file `CommuteStLouis.csv` contains a random sample of commute times (in minutes) for 500 workers in St. Louis, Missouri.

(a) Use R to create a bootstrap distribution of the sample mean consisting of 1000 simulations. Create a histogram of the bootstrap distribution. Include this plot in your homework submission along with the R code you used to generate it.

(b) Use R to calculate the bootstrap standard error of the sample mean.

(c) Using the plug-in method, calculate a 95% bootstrap confidence interval for the average commute time in St. Louis.

(d) Provide an interpretation of your interval from the previous part within the context of the problem.

[1] National Opinion Research Center, General Social Survey, 2010.

[2] Twitter News Consumers: Young, Mobile and Educated. November 4, 2013. Pew Research.