Psychology 105, Advanced Research Methods, Homework #2

Available 2/28/2017, due 3/7/2017

Please review the syllabus for instructions on how to submit homework.

In this assignment, you will continue to work with the Statlab50 data set that you created for Homework #1.

1. The form of Raven’s Progressive Matrices that the Statlab kids took has 60 items, so that 50% correct would be a score of 30. The true standard deviation in the \( N=1296 \) Statlab population is \( \sigma = 9.970514 \). Use that knowledge to test the null hypothesis that \( \mu = 30 \) (i.e., that on average the kids got half of the items correct). Use a two-tailed alpha level of .05. You may use a \( Z \) statistic in the raw metric, as demonstrated in class on 2/23/2017, or in the standardized metric, as demonstrated on 2/28/2017. In either case, state the critical value of your mean or your standardized \( Z \) statistic, and report your decision about the null hypothesis.
Interpret what this implies about the original question (which was “Is the population mean Raven score equal to 30?”).

2. Realistically, you would almost never know the true standard deviation. Repeat question 1a, this time using your sample standard deviation and a \( t \) test. Address all the same points you answered in 1a.

3. What are the assumptions that must be met in order for the \( t \) test you have just performed to be valid? Assess those assumptions, and state your conclusion about each assumption. (You may find it useful to know that the Statlab data were collected in such a way that no siblings were included.)

4. The true population mean for the Statlab population is 30.95062. Use a \( t \) test to test the null hypothesis that \( \mu = 30.95062 \). State your decision to reject or not reject the null. Everyone in our class is doing the same task with independent samples. What proportion of the class do you think will reject the null for this situation in which the null hypothesis is true?

When you submit your work, you should paste your R code (and its results) into your document. That way, we can help you figure out what went wrong if something didn’t work right. Remember to submit one document that includes all of the required work in an organized way that makes it easy for us to see what is what. (Organizing your results using the same outline structure in which the tasks are presented is ideal.)