

Math 8 SPSS Project 3

Due May 7, 2010

You may work by yourself on this project or with one other person. If you work with someone else, the two of you are to turn in one project with both of your names on it.

1. IQ scores are normally distributed with a mean of 100 and a standard deviation of 15. Generate 30 samples of 12 such scores. To do this, run the syntax file entitled "Normal," in the SPSS syntax files folder in the Greenwell folder in the Shared drive, similar to the way you ran a syntax file Project 2. Before running the file, make sure that Random is checked under Transform-Random Number Generators-Active Generator Initialization-Set Starting Point, as in Project 2. The results should appear in columns labeled x1 to x30.

2. Generate a 90% confidence interval for μ , the population mean, without assuming that σ is known, for each of the 30 samples generated in step 1. To do this, under Analyze, select Compare Means, then One-Sample T Test. Under Test Variables, put x1 through x30, and make sure 0 is listed as the Test Value. (To select all 30 variables, you can click on x1, then scroll to the end, and while holding down the shift key, click on x30.) Then click Options and select a 90% confidence interval. Click Continue, then OK.

3. Do a test of the hypothesis $H_0: \mu = 100$ at $\alpha = 0.10$, without assuming that σ is known, for each of the 30 samples generated in step 1. To do this, repeat the instructions of Step 2, but change the Test Value to 100. Then print the output, which should show your 30 confidence intervals and your 30 hypothesis tests. The tables for these two parts of the output have the same format, but the information will be different.

4. Answer the following questions:

- How many of the 30 confidence intervals would you expect to contain 100? Explain.
- How many of the 30 confidence intervals actually contain 100? Highlight those that don't on your output.
- Would you expect the answers to questions a) and b) to always be exactly the same? Explain.
- In how many of the 30 hypothesis tests would you expect to reject the null hypothesis at $\alpha = 0.10$? Explain.
- In how many of the 30 hypothesis tests did you reject the null hypothesis at $\alpha = 0.10$? You can determine this by looking for those with a significance less than 0.10. Highlight those in which the null hypothesis is rejected on your output.
- Would you expect the answers to questions d) and e) to always be exactly the same? Explain.

5. Gather some data of your own, formulate a question that can be answered using statistics, and use SPSS to do the statistical analysis. Include all of the following:

- Your data. You may get it from any book (except our text), the Internet, or by collecting it yourself. Be sure to tell me exactly how you got your data. (For example: "I looked up the weather reports from the *New York Times* for each day of March, 2008, and recorded whether it rained or not.")
- The question you are trying to answer. (For example: "In March 2008 it rained more than 50% of the time, but my guidebook for New York City says that it rains in March only 30% of the time. I want to test whether this March really had a higher probability of rain, or whether the probability is just 30%, and this March just had more rainy days by chance.)

- c) Any assumptions you are making, and the validity of those assumptions. (For example: How random is your sample? Does your method of analysis assume that the data is from a normal distribution?)
- d) The SPSS output. Be sure to show the hypothesis test, the confidence interval, and any descriptive statistics (histograms, boxplots, etc.) that help to illustrate your results.
- e) Your analysis and conclusions. State carefully what you have proven or failed to prove. Give the P -value, and discuss how confident you can be about your results.

As part of this project, you must make an appointment with me no later than April 23, so you can tell me about your plan to collect data, the question you are trying to answer, your method of analysis, and any progress you've made so far. This is to maximize your likelihood of having a successful project. It may be necessary to make further appointments.

Be creative! Have fun! See me, call me, or e-mail me if you have questions or need guidance.