**Math 155, Fall 2016**

**MINITAB Assignment #3 – Due Monday, December 5**

For each problem on the following page, use Minitab to carry out the hypothesis test. Then, interpret the result – this will require some writing. For each problem, you should write each of the following:

1. The null hypothesis and the alternative hypothesis. Write each of these in words, and also symbolically.
2. The type of test you used – including whether it’s a one- or two-tailed test.
Explain why the type of test you chose to use was appropriate.
3. The P-value of the hypothesis test. (This will come from Minitab)
4. The result (or decision) of the hypothesis test. Write this as a complete sentence, using non-technical language, and make it relevant to the original question.

Please turn in your work by Monday, December 5. (I prefer to receive your assignment at the beginning of class on the 5th, but I will accept it as long as you get it to my office, 108 Devilbiss, by 2PM at the latest.)

Sample question (use this as a model for your answers to the questions on the next page):

In a previous study, it was found that the average (mean) rainfall in the Republic of Elbonia was 0.25 inches per day. A researcher is testing to determine whether the average rainfall has increased since the previous study. Based on rainfall measurements taken on a random sample of 50 days [data omitted for this example], the researcher will test at the 5% significance level to determine whether the average rainfall in Elbonia is now more than 0.25 inches per day.

Sample answers – NOTE: The parts I’d want you to write are in **boldface** font below.

a)The hypotheses are as follows:

$H\_{0}:μ=0.25$ **- “The mean daily rainfall in Elbonia is 0.25 inches per day.”**

$H\_{a}:μ> 0.25$ **- “The mean daily rainfall in Elbonia is more than 0.25 inches per day.”**

**b) The alternative hypothesis (“greater than”) indicates a one-tailed test. Since our sample size is “large” (greater than 30), we may use a t-test.**

The results of a t-test are shown below. (You would not write this, nor should you print out the Minitab output; just carry out the test and report the results as shown in parts (c) and (d) below.) The only part of the Minitab output we’re really interested in right now is the P-value, labeled “P” in the sample output below:

 95% Lower

Variable N Mean StDev SE Mean Bound T P

C1 50 0.2639 0.1400 0.0198 0.2307 0.70 0.243

**c) From the Minitab output, we see that the P-value is 0.243.**

Since the P-value is greater than the chosen significance level of 0.05 (given by “the researcher will test at the 5% significance level”), we will not reject the null hypothesis. So, our answer to (d) would be something like this:

**d) At the** $α=0.05$ **level of significance, we do not have sufficient evidence to conclude that the mean daily rainfall in Elbonia is more than .25 inches per day.**

**Minitab Assignment #3 Problems**

1. The mean weight of all babies born at Marvadel Hospital last year was 7.6 pounds. A random sample of 35 babies born at this Marvadel Hospital this year was selected, and the weight of each baby was recorded, as shown here:

8.2 9.1 6.9 5.8 6.4 10.3 12.1 9.1 5.9 7.3

11.2 8.3 6.5 7.1 8.0 9.2 5.7 9.5 8.3 6.3

4.9 7.6 10.1 9.2 8.4 7.5 7.2 8.3 7.2 9.7

6.0 8.1 6.1 8.3 6.7

Test at the 5% significance level whether the mean weight of all babies born at Marvadel Hospital this year is actually *higher than* 7.6 pounds.

2. A past study concluded that adults in America spend an average of 18 hours a week on leisure activities. A researcher wants to test the claim that this result is no longer correct. To do so, he selects a random sample of 20 adults and asks each of them how many hours they spend per week on leisure activities. Their responses are as follows.

 14 25 22 38 16 26 39 23 41 33

 41 38 40 38 1 40 53 2 1 44

Test at the 5% significance level whether the new data contradicts (in either direction) the result of the earlier study.

3. A convenience-store owner guesses that he sells an average of about 40 snow cones per day. To test this claim, a random sample of 20 days yields the following data for the number of snow cones sold each day.

 18 43 40 16 22

 30 29 32 37 36

 39 34 39 45 28

 36 40 34 39 52

At α = .05, does the data shown here contradict the claim that an average of 40 snow cones are sold per day?

4. A test of race car driving ability was given to a random sample of 10 student drivers before and after they completed a formal driver education course at the Daytona School of Racing. The results follow:

 Before 100 121 93 146 101 109 149 130 127 120

 After 136 129 125 150 110 138 136 130 125 129

The school claims that the course increases scores. Does the data support that claim? Test the school’s claim at the 0.05 significance level. If you want to develop the skills of a race car driver, does this course seem helpful?

5. A researcher is testing to determine whether students who listen to classical music while studying do better on exams than students who listen to heavy metal music. A random sample of students who listen to each type of music while studying is selected; each student is given a standardized test after having studied for two hours while listening to his/her preferred music type. The summarized results are as follows:

Classical music listeners: Sample size: 46; mean score: 84.5; standard deviation of scores: 14.5

Heavy metal listeners: Sample size: 38; mean score: 80.8; standard deviation of scores: 12.3

Test at the 10% significance level whether this data supports the claim that students who listen to classical music while studying perform better on tests than students who listen to heavy metal while studying.