Pledge:

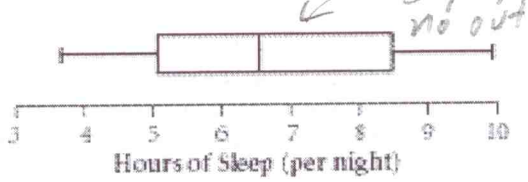
9/30/2005
Dr. Lunsford

MATH271 – Applied Statistics
Quiz 5

Name: Solution
20 Points Total

I. A school psychologist reports that the mean number of hours the students at this school sleep each night is 8 hours. The students believe the mean is not 8 hours but something else. To find an estimate of the true mean, they select a random sample of 15 students and find the sample mean is 6.67 hours with a sample standard deviation of 1.88 hours. A stemplot and boxplot of the data are shown here. Please answer the following questions. (12 points total)

roughly symmetric
no outliers



Stem-and-leaf of Hours of Sleep
N = 15
Leaf Unit = 0.10

3	7
4	39
5	149
6	15
7	015
8	58
9	39

roughly unimodal

(a) Identify a null and an alternative hypothesis that will test the students' claim against the school psychologist's claim. Clearly identify which hypothesis is which claim and also clearly identify the meaning of any variables you may use. (3 points)

$H_0: \mu = 8$ (psychologist's claim)
$H_1: \mu \neq 8$ (students' claim)
μ is mean (or average) amount of sleep the students at this school get each night.

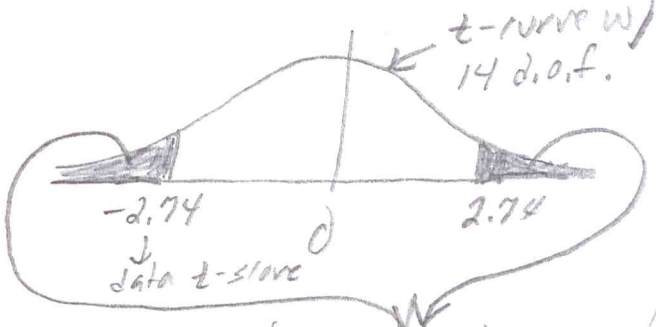
(b) What test will you use to test your hypotheses above? Why? (2 points)

t-test for a population mean:
σ is unknown (will use s instead)
n is small ($n = 15 < 30$)
Based on box & stem plots it is reasonable to assume "hours of sleep per night" is normally or approximately normally distributed.

(c) Find the value of your test statistic and *p*-value of the test. Draw a picture below which graphically represents the value of your test statistic and the *p*-value. Clearly label all relevant items on your picture. (4 points)

T-Test Input:
$\mu_0 = 8$
$\bar{x} = 6.67$
$Sx = 1.88$
$n = 15$
$\mu: \neq \mu_0$

Output:
$t = -2.74$
$p = .01596$



(d) Give the conclusion of your test in the context of this problem. (3 points)

Since p is very small
$p < .10$ and $p < .05$ we will reject H_0 in favor of the alternative, H_1.
The data supports the students' claim. The mean number of hours students at this school sleep each night is not 8 hours (i.e. it is significantly different than 8 hours).

II. In a poll of 1000 likely voters, 560 say that the United States spends too little on fighting hunger at home. Please answer the following: (8 points total)

(a) Find a 95% confidence interval for the true proportion of voters who feel this way. Please show all calculator input and give your answer in interval form. (4 points)

1-Prop Z-Int Input:
$x = 560$ C-level = .95 C.Interval: (.52923, .59077)
$n = 1000$

(b) Fill in the blanks in the following sentence: A newspaper would report the above result in part (a) as follows: The percent of likely voters who believe that the United States spends too little on fighting hunger at home is 56 with an error of 3.077 % with 95 % confidence (based on a sample size of 1000 randomly chosen voters.). (2 points)

(c) Please compose a complete English sentence that interprets the interval computed in part (a) in the context of this problem. Clearly indicate the meaning of any variables you may use. (2 points)

We are 95% confident that the true proportion (%) of voters who believe the US spends too little fighting hunger at home is between .52923 (52.92%) and .59077 (59.08%).