April 28, 2009

Elementary Statistics: Extra Credit Assignment

2% of total grade

Due Sunday, May 3rd 2009 before midnight (My office: 241 Tome)

Problems

Problem 1: Using Minitab to do the exercise 10.20 on page 647 in the book.

• You will have to enter the data into Minitab
Type numbers in Column C1.

• For part(a), compute the summary statistics, a histogram and a probability plot.
Stat → *Basic Statistics* → *Display Descriptive Statistics...*
Graph → *Histogram*
Graph → *Probability plot*

• For part(b), have Minitab compute the interval.
Stat → *Basic Statistics* → *1-Sample t...*

• For part(d), state your hypotheses, but use Minitab to perform the test. Clearly state the test statistic and the p-value of the test, along with your conclusion.

• **Provide all the Minitab output for each part!**

Problem 2: Do Exercise 13.4 on page 821 of the text.

However, following these directions:

• Enter the data into Minitab using descriptive variable names.

• For part(a), use Minitab to construct the scatter plot.

• For part(b), use Minitab to compute the least squares line:
Stat → *Regression* → *Regression...*
Clearly state the least squares regression line.

• Part(c) and (d) are both done by hand.

• **Be sure to Provide all the Minitab output.**

Problem 3: Download the Minitab data file BodyTemp.mts from the course web site. This data file contains the body temperature of 130 subjects (65 male and 65 female), and were derived from an article in the *Journal of the American Medical Association* entitled " A Critical Appraisal of 98.6 Degrees F, the Upper Limit of the Normal Body Temperature, and Other Legacies of Carl Reinhold August Wunderlich."

a) Generate the descriptive statistics for body temperature.
Stat → *Basic Statistics* → *Display Descriptive Statistics...*

b) What was the sample mean body temperature, and did it equal 98.6 F?

c) Hopefully in part(b) you computed a sample mean that was different from 98.6 F. This raises the question of whether this result is so unusual that it is unlikely to be due to simple sampling variability. Compute a 99% confidence interval for the true mean body temperature μ.

Stat → *Basic Statistics* → *1-Sample t...*

Then click the *Options* button, and change the confidence level to 99.

d) Was 98.6 F contained within the confidence interval that you compute in part(c)? Based on this confidence interval, do you believe that the accepted mean of 98.6 F could be wrong, or is this just an extremely unusual sample?

e) Let's perform a hypothesis test to see if there is evidence that the mean body temperature is less than 98.6 F. Let μ = the true mean body temperature.

i) What are the appropriate null and alternative hypotheses?

ii)Use Minitab to perform the t-test:
Stat → *Basic Statistics* → *1-Sample t...*

Check the *Perform hypothesis test* checkbox and in the *Hypothesized mean* text box enter *98.6*. Then click the *Options* button, and change the *Alternative* drop-down menu to *less than*.

iii) What is the test statistic and the p-value of this test?

iv) Based on this p-value, do you believe that there is evidence that the true mean body temperature is less than 98.6 F? If so, how strong do you consider the evidence (based on the p-value)?

f) Generate both a histogram and a normal probability plot of the data, and comment on whether or not you believe the assumptions for this test are satisfied, i.e., body temperatures follow an (approximate) normal distribution.

Graph → *Histogram*
Graph → *Probability plot*

- **Provide all the Minitab output for each part!**