Lab 5 (80 pts.) - Interpretation of Confidence Intervals and the difference between t and z tests

Objectives: A Better Understanding of Confidence Intervals and the critical values.

A. (40 points) Interpretation of a Confidence Interval (no data file required). Use software to generate 40 observations from a normal distribution with μ = 10 and σ = 2. Repeat this 30 times.

- 1. (5 pts.) Code
- 2. (15 points) From each set of observations, compute a 80% confidence interval. No data is required, however, you need to include all 30 confidence intervals.
- 3. (10 points) Determine how many of these intervals contain the population mean, $\mu = 10$. Please indicate for each confidence interval if it contains the value or not. It is acceptable to just highlight the intervals that do (or don't) contain the mean. Is this number what you would expect? Why or why not?
- 4. (10 points) GROUP PART: This is a group assignment and is due on Blackboard at Midnight on FRIDAY, March 4. Be sure that the names and sections of each person are at the top of the page. Combine your data with 3 or 4 other students (in any of your instructor's sections) and answer the following questions (no data is required for this part):
 - a. Is the number of intervals that contain the mean what you would expect for the combined data? Please explain your answer.
 - b. Are the results from part 4a (the group part) more consistent with the theory than part 3 (the individual part)? Is this what you expected? Please explain.

B. (40 points) Biology and Environmental Science (Data Set: hogs.txt) For the week ending in 5/29/13, the Iowa Department of Agriculture reported the mean weight of barrows and gilts (young male and female hogs) as 275.4 pounds. To check this claim, a random sample of twelve hogs was obtained and each was carefully weighed.

- 1. (5 pts.) Code
- 2. (6 pts) Create a histogram, boxplot, and a Normal quantile plot of these data.
- 3. (4 pts) Write a description of the distribution using the results in part 2. Comment on the skewness and Normality of the data. Note if there are any outliers.
- 4. (5 pts) Based on your observations in parts 2 and 3, is it appropriate to analyze these data using the t or z procedures? Briefly explain your response. The answer should be the same for the t and z procedures.
- 5. (5 pts.) Find a 95% z confidence interval for the true mean weight of barrows and gilts. Note: so that we can compare parts 5) and 6) more easily, we will be assuming that the population standard deviation is the same as the sample standard deviation. If this was not done then the intervals would be different because of the different value of σ and s.
- 6. (5 pts.) Find a 95% t confidence interval for the true mean weight of barrows and gilts.

- 7. (5 pts.) Are these two intervals the same or different? Please explain your answer. If they are different, comment on the reason.
- 8. (5 pts.) Using your answers in parts 5 and 6, is there any evidence to suggest that the claim (μ = 275.4) is wrong? Justify your answer.