ADM 2304 -- ASSIGNMENT 1

Due Date: Friday, January 31, 2014 at 11:59 pm.

Instructions:

1. *This assignment should be uploaded as a pdf document to Blackboard Learn.*
2. *If you are performing a hypothesis test, you must state the hypotheses, the level of significance, the decision rule in terms of the critical value, the test statistic or p-value, the decision (whether to reject or not to reject the null hypothesis), and* ***a conclusion*** *in words that answer the original question.*
3. *You may use Minitab or other software for any calculations. However, you must do manual calculations when asked. You may paste your output onto your assignment; however, this output does not replace any of the steps outlined above.*
4. *The data in the Minitab files can be found in* ***Assign1Data.xls****.*
5. *Remember to include your personal ethics statement.*

1. In the 2011 federal election, 39.62% of the electorate voted for the Conservative party, 30.63% for the NDP, and 18.91% for the Liberal Party.

(a) A recent poll of 1000 respondents found 32.1% would support the federal Liberals and 26.2% would support the Conservative Party. Test whether this is sufficient evidence to show that the Conservative vote has dropped by more than 10% from their share of the popular vote in 2011. Use the .01 level of significance and show your manual calculations.

(b) Suppose you wanted to estimate the national level of support for the Conservatives using a 99% 2-sided confidence interval with a margin of error of ±1%. What sample size would be required?

(c) Suppose that, in a random sample of 17 University of Ottawa students, only 2 indicated a preference for the Conservatives. Test whether this is sufficient evidence to indicate that the level of support for the Conservatives among U of O students is lower than the 39.62% share of the popular vote in 2011. Use the .01 level of significance and explain how you would calculate the p-value for this test. Why does this not allow us to infer anything about the national level of support for the Conservatives?

2. The file **BMI_sample.mtp** on Blackboard contains two samples of BMI values from the male and female populations. Test at the 0.05 level of significance whether there is sufficient evidence to show that the average female BMI (in the population) is less than 26. Explain whether your test satisfies the underlying assumptions, with reference to graphical evidence.

3. Two of the columns, **OWmale** and **OWfemale**, in the same dataset code the BMI values as:

0 - if BMI $\leq$ 25.4 (these are considered "not overweight");
1 - if BMI $\geq$ 25.5 (these are considered "overweight").

a. Test whether there is sufficient evidence to show that the proportion of overweight males is different from the proportion of overweight females in the population. Use the critical value approach and the 0.05 level of significance. Perform the test manually after using Minitab to summarize the data.
b. Now find the p-value for your sample result and explain how the p-value would be found if you did not have access to statistical software.
c. Finally calculate manually the confidence interval for the true difference between the two proportions.
d. Explain how the results in (b) and (c) are consistent with your conclusion in (a).

4. The file **Liabilities.mtp** on Blackboard contains data on the total liabilities in 2007 for companies listed on the S&P 500 Index.

a. Treating the dataset as the population, use Minitab to calculate the population mean. Now set aside all population information until part d.
b. Now use Minitab (Calc Menu – Random Data – Sample from Columns) to draw twenty samples of size n = 50. This procedure must be replicated twenty times (note that if you open up the same sampling dialog box each time from the menu, then you only have to replace the last "destination" column with the next one). From each sample, use Minitab to calculate a 95% confidence interval estimate for the population mean, assuming you do not know the population standard deviation (this interval estimation can be done in one operation on all twenty columns).
c. For the first sample, confirm the Minitab generated interval by calculating the interval manually. Display the sample data graphically and comment on whether the relevant assumption regarding the population distribution is warranted (state clearly the assumption needed to justify the interval estimation).
d. Count the number of intervals that contain the true value of the population mean from part a.
e. Explain why the number in (d) is not necessarily equal to the "expected value" of 19.