STA130 Professional Report Assignment

(Initial version due in lecture at 2:10 pm sharp on Monday, March 20, 2017.)

(Final version due in tutorial at 2:10 pm sharp on Wednesday, April 5, 2017.)

(To be discussed in tutorial on March 15.)

(See also the related Professional Presentation Assignment.)

NOTE: You may discuss this assignment with other students, but you must understand and type and create your solutions <u>entirely</u> by yourself. You can also ask your TA for assistance, either after a tutorial or by arranging to meet with them another time. And, don't forget the information at www.probability.ca/Rinfo.html about the "R" statistical software package, and the writing resources available at www.writing.utoronto.ca and www.writing.utoronto.ca/writing-centres/arts-and-science and www.artsci.utoronto.ca/current/advising/ell.

INTRODUCTION:

You have been <u>hired</u> by the mayor of a small city as a <u>professional statistical consultant</u>, to do a statistical <u>analysis</u> of the city's traffic accidents. You will be provided with <u>data</u> (different for each STA130 student) giving the city's spending on safety advertising, number of police officers deployed, number of visitors' conventions hosted, and number of traffic accidents, for each of the 120 consecutive months from January 2006 through December 2015. You are also told that the city got a <u>new Police Chief</u> on January 1, 2011. Your <u>assignment</u> is to perform various statistical analyses on your data, and determine various statistical findings. You are then to write a <u>professional report</u> for the mayor, presenting your detailed analysis and findings, clearly and professionally.

THE ASSIGNMENT:

You should proceed in the following steps:

1. Obtain your data! <u>Before your March 8 tutorial</u>, go to the Web address formed as:

http://probability.ca/sta130/reportdata/YourStudentNumber.txt

For example, if the professor were a student in this class, he would go to:

http://probability.ca/sta130/reportdata/840245070.txt

Save the resulting .txt file on your own computer or memory stick. This file will provide the data for your report. (Contact your TA if you have any problems obtaining your data.)

2. Take a <u>look</u> at your data! Your .txt file should begin something like this:

Year Month Spending Police Conventions Accidents
2006 January 56.7 82 2 625
2006 February 64.2 77 4 831

This means that in the month of January 2006, the city spent 56.7 thousand dollars on safety advertising, and deployed 82 police officers to patrol the city streets, and hosted 2 visitors' conventions, and had a total of 625 traffic accidents. In February 2006, they spent

64.2 thousand dollars on advertising, deployed 77 police officers, hosted 4 conventions, and had 831 traffic accidents. And so on. (Note: Each STA130 student will be given different data values.) There should be a total of 120 rows of data, in addition to the "header" row at the top. Be sure that you understand the meaning of your data well.

3. Find a way to read your data into R. (Hint: You may wish to use the R command "read.table", with the options "as.is" and "header" both set to TRUE.) When you are done, you should have one R vector giving all 120 Spending figures, and another R vector giving all 120 Police figures, a third R vector giving all 120 Convention counts, and a fourth R vector giving all 120 Accident counts. You should then check these vectors against the data file, to make sure you have read the data correctly.

4. For fun, make up some additional background information for this report. What is the name of the city? What is the name of the mayor? Why is the mayor so concerned about traffic accidents? Who is the new Police Chief, and why did the mayor hire them? And so on. Try to be creative; this will add some "flavour" to your report.

5. Perform lots of different statistical analyses (in R) related to your data! It is up to you to choose precisely which analyses to perform. You may wish to consider questions such as the following:
- What are the mean and standard deviation of each of the quantities considered?
- What is a 95% confidence interval for the city's true average number of traffic accidents per month?
- How is the number of traffic accidents related to the amount of spending on safety advertising? Is there a statistically significant correlation? Do you think that one causes the other?
- How is the number of traffic accidents related to the number of police officers deployed? Is there a statistically significant correlation? Do you think that one causes the other?
- How is the number of traffic accidents related to the number of conventions hosted? Is there a statistically significant correlation? Do you think that one causes the other?
- Did the new Police Chief have an effect? That is, is the number of police officers deployed statistically significantly different in 2011–2015 than in 2006–2010? What about the number of traffic accidents? What, if anything, does this imply?
- Do you have any recommendations for the mayor, about what to do in the future regarding safety advertising and/or police deployment?

You do not need to consider all of the above questions, but you should certainly consider most of them (perhaps modified as appropriate), plus hopefully some additional questions that you think of yourself. To do a good job as a consultant, you should consider a wide variety of questions and approaches and investigations.

6. Write a report for the mayor! Your report should be written in a clear, formal, professional style, so that the mayor will be proud to receive and share and publicise it. It should clearly explain all of your statistical analyses and findings in a way that is precise and specific, but which is still easy for the mayor to understand (even though the mayor never took

a statistics class). It should be <u>typed</u> and <u>double-spaced</u>. It should be well <u>organised</u>, and presented in the following <u>sections</u>:

- A separate <u>Cover Page</u> including a title, the consultant/student's name and student number, the date, the mayor's name, etc.

- An <u>Executive Summary</u> of 100–200 words, which briefly summarises your findings for quick reading (e.g. by an "executive"). (Note: Although this section comes first, you should write it <u>last</u>.)

- A <u>data summary</u>, which explains what data was provided to you, and provides graphs of each of the four data vectors discussed in Step 3 above.

- The <u>main report</u>, of recommended length 900–1200 words, with recommended sections:

  - Background & Objective: A brief introduction to the project and your goals.
  - Method & Analysis: A major section which clearly explains the statistical analyses you performed, including <u>why</u> you picked the analyses that you did.
  - Findings/Conclusions: The results of your analyses.
  - Recommendations for the mayor.

- A separate <u>Technical Appendix</u> (which the mayor might not read, though the mayor's statistically-trained assistant will), which includes the R commands you have used and the corresponding R output from them, including the four vectors of data. This part can be as long as you like, and it does not have to be explained in detail, but it should illustrate the data you have used and the precise statistical analyses you have done.

7. <u>Hand in</u> your report (initial version) to your TA at the beginning of lecture at 2:10 <u>sharp</u> on Monday March 20.

8. Your report will be returned to you in tutorial on Wednesday March 29, with feedback and suggestions for improvement.

9. Then, make <u>revisions and improvements</u> to your report, based on the feedback and suggestions you have received.

10. <u>Hand in</u> your new (final) version of your report at the beginning of tutorial at 2:10 <u>sharp</u> on Wednesday April 5. Also include your <u>previous (marked) initial report (for comparison)</u>, and a <u>very brief (two-three sentence) explanation</u> of how you incorporated the feedback on your initial report into your final report.

11. Your final grade for this report will be the <u>average</u> of your grade for your initial version, and your grade for your final version. So, it is important to create a good initial version, and it is <u>also</u> important to improve it as appropriate for the final version.

Good luck and have fun!