

MAT 2379 C (Fall 2017) Assignment 4
Professor: Maryam Sohrabi

Deadline: Friday, November 24, 2017 Before 3:00 pm Sharp (Math department drop boxes)

Please print out this page, sign it and attach it to the first page of your assignment.

Student Name _____

Student Number _____

By signing below, you declare that this work was your own and that you have not copied from any other individual or other source.

Signature _____

Late assignments will NOT be accepted; nor will unstapled assignments. Professors in the math department will not lend you a stapler.

You should complete ALL the questions in the assignments. It is possible, however, that not all the questions will be marked. In that case, the same questions will be marked in all assignments. You will not be informed beforehand which questions will be marked.

Part (I) Solve the following problems from the textbook using a *Faculty-standard calculator and a Standard Normal Table*:¹

- Do the following questions from the text book (Second edition):

8.4 8.6 9.2 9.6 9.10

¹Only the following calculators are allowed during Faculty of Science examinations: Texas Instruments TI-30 and TI-34, Casio FX-260 and Casio FX-300 (scientific and non-programmable calculators).

- **Additional question:**

We are at the planning stage of an experiment to study the effect of a diet on the weight gain of beef cattle, measured over a 140-day test period. Suppose that the weight gain of beef cattle is normally distributed with a standard deviation of 0.5 kg. How large should the sample size be in order to be 90% confident that the error of the estimate of the mean will not exceed 0.01 kg?

Part (II) Use R to solve the following problem.

1. Studies were conducted in a metropolitan area to determine the concentration of carbon monoxide near a large highway. There are concerns that the average concentration of carbon monoxide exceeds 100 parts per million (ppm) at this location. The researchers captured air bags and used a spectrophotometer to determine the concentration of carbon monoxide. Bellow are the results for 25 randomly chosen times over a period of 6 months:

100.1 101.9 101.3 102.1 98.3 100.3 100.2 109.6 98.5
92.0 103.7 108.5 104.9 109.8 95.3 93.1 107.0 92.1
109.2 93.2 93.1 107.3 97.1 104.4 102.3

- (a) Use R to verify that the concentration of carbon monoxide is normally distributed.
- (b) Formulate the null and alternative hypotheses to test that the average concentration of carbon monoxide exceeds 100 ppm.
- (c) Using R to test the hypotheses formulated in part (b). Give your conclusion at the significant level $\alpha = 0.10$.
- (d) If your conclusion in part (c) is wrong, did you commit a type I error or a type II error?

Remark: The above concentration of carbon monoxide for 25 randomly chosen times over a period of 6 months are also found in the tab-delimited text file `DataCarbon.txt`.