

MAT 2379 3X (Spring 2013)
Assignment 3
Deadline: Tuesday, June 25, 2013 (in class)
There are a total of 6 questions.

Part I) Answer the following 2 questions **without** the use of R.

- 1) The Virginia Cooperative Extension reports that the mean weight of yearly Angus steers is 1152 pounds. Suppose that the weight of such an animal is normally distributed with a mean of 1152 pounds and a standard deviation of 284 pounds.
 - (a) Which would be more unusual a steer weighing less than 1110 pounds or a steer weighing more than 1200 pounds? Explain, based on the probability of these events occurring.
 - (b) Find the weight x (in pounds) such that 90% of such steers weigh at most x pounds?
 - (c) Find the weight x (in pounds) such that 85% of such steers weigh at least x pounds?

- 2) The following data gives the blood glucose level (in mmol/L) for 12 persons who suffer from hypoglycemia (low blood glucose levels, before the first meal of the day:

4.2, 4.7, 4.8, 4.5, 4.3, 4.25, 5.2, 4.9, 4.4, 4.6, 5.0, 5.7

- (a) Find the median, the first quartile and the third quartile.
- (b) Calculate the IQR. Are there any outliers?

Part II) Answer the following 4 questions **with** the use of R.

Remarks:

- You must provide the R commands and output that were used in answering the question.
 - The R output alone is not an answer to a question. The R output is used to support your answer.
 - Please do not printout your whole R session. Only provide the R commands and output that are necessary to answer the question.
- 3) The Virginia Cooperative Extension reports that the mean weight of yearly Angus steers is 1152 pounds. Suppose that the weight of such an animal is normally distributed with a mean of 1152 pounds and a standard deviation of 284 pounds.
- (a) Which would be more unusual a steer weighing less than 1110 pounds or a steer weighing more than 1200 pounds? Explain, based on the probability of these events occurring.
 - (b) Find the weight x (in pounds) such that 90% of such steers weigh at most x pounds?
 - (c) Find the weight x (in pounds) such that 85% of such steers weigh at least x pounds?
- 4) Refer to Problem 16.2 in the textbook. Create a dataframe in R that contains the data from the file *ICE-SHELF.txt*.
- (a) List the names of the variables found in this table and assign the values of the variable called “precipitation” to a variable called x .
 - (b) Answer Problem 16.2.(a), i.e. find the mean and the standard deviation of x ;
 - (c) Answer Problem 16.2.(b), i.e. find the median and quartiles of x (using the formula given in the book), construct the boxplot of x and identify the outliers if they exist;
 - (d) Construct a histogram for x .

- 5) Refer to Problem 9.1 in the textbook. The data are found in the file *PENGUINS.txt* and also in the textbook. We would like to compare the length of a penguin for three different species: the king penguin, the gentoo penguin and the chinstrap penguin. Construct the three boxplots side-by-side. What do you observe?
- 6) Vitamin D is essential for strong, healthy bones. Our bodies produce vitamin D naturally when sunlight falls upon the skin, or it can be taken as a dietary supplement. Some people are concerned that this generation of children is at increased risk to develop a bone disease because they are more likely to watch TV or play video games than spend time outdoors. Suppose that doctors test a group of 100 elementary school children. Under the assumption that about 9% of children in Canada are deficient in vitamin D,
- (a) what is the probability that they will observe between 8 and 13 vitamin D deficient kids, inclusively?
 - (b) what is the probability that they will observe more than 20 vitamin D deficient kids?