**MATH 1131 3.0 - Fall 2015**
**Assignment 1**
*(Due Date: October 21, 2015)*

**Question 1:** At the PISA Web site (www.pisa.oecd.org), there are summary statistics for math scores of 15-year-old males and females separately. The mean math scores for males, the mean math scores for females, and also the difference of the two means are listed in the Excel file.

a. Use any software and obtain the histogram for the mean math scores for males.

b. How would you describe the overall shape of this data set? Do you suspect any outlying group in this data set?

c. Report the 5-number summaries for the difference of the two means. *(Note: Don't use software. Use the method discussed in class).*

d. Obtain the back-to-back stemplot and compare the distribution of the mean math scores for males and for females.

e. Use any software and report the sample mean and sample standard deviation for the mean math scores for females.

f. Based on the given data, what proportion of the mean math scores for females falls within 2 standard deviation of the mean?

**Question 2:** In an experiment to test the susceptibility of an endangered plant species to fungus, some specimens of the plant were raised, along with a related exotic species and marigolds (as a control) in a greenhouse. At two months of age, they were inoculated with the fungus, and one month later, all of the plants were classifified as healthy, diseased, or dead. The results are reported in the contingency table below:

| | Control | Engangered | Exotic | Total |
|---|---|---|---|---|
| Dead | 15 | 16 | 6 | 37 |
| Diseased | 21 | 3 | 9 | 33 |
| Healthy | 24 | 0 | 42 | 66 |
| Total | 60 | 19 | 57 | 136 |

a. A plant is selected from the greenhouse at random. What is the probability that the plant is either endangered or healthy?

b. A plant is selected from the greenhouse at random. What is the probability that it is healthy given that it is not an endangered plant?

c. A plant is selected from the greenhouse at random. Are the events of being healthy and being endangered independent? Why or why not?

**Question 3:** The amount of sodium in a randomly selected 9-ounce serving of chicken noodle soup has a normal distribution with mean 1106 mg and standard deviation 150 mg. Suppose an 8-ounce serving chicken noodle soup is randomly selected.

a. What is the probability that the amount of sodium is over 1000 mg?

b. What is the probability that the amount of sodium is between 800 mg and 1200 mg?

c. Given that the amount of sodium is over 1000 mg, what is the probability that it is less than 1200 mg?

d. Find a symmetric interval about the mean such that 90% of all 8-ounce serving chicken noodle soup have sodium amount in this interval.

**Question 4:** Suppose that in a weekly lottery, you have 2% chance of winning a prize with a single ticket. Assume you buy only 1 ticket per week for 52 weeks.

a. What is the probability that you win no prizes?

b. What is the probability that you win 3 or more prizes?

c. What is the mean and standard deviation of the number of prizes you win?

d. What is the probability that the first winning is in the sixth week?

**Question 5:** An appliance dealer sells three different models for upright freezers have 13.5, 15.9 and 19.1 cubic feet of storage space respectively. Let $X$ be the amount of storage space purchased by the next customer who buy a freezer. Suppose that $X$ has the following probability distribution:

| $x$ | 13.5 | 15.9 | 19.1 |
|---|---|---|---|
| $P(X = x)$ | 0.2 | 0.5 | 0.3 |

a. Find the sample mean, and standard deviation of $X$.

b. If the price of the freezer depends on the size of the storage space such that

$$Price = 25X - 8.5$$

What is the mean and standard deviation of $Price$?

**Question 6:** The types of books borrowed by 36 randomly selected students from York University are:

| | | | | | |
|---|---|---|---|---|---|
| Psychology | Science | Education | Education | Technology | Science |
| Law | Technology | Science | Education | Law | Technology |
| Psychology | Literature | Literature | Education | Psychology | Law |
| Psychology | Literature | Technology | Law | Psychology | Literature |
| Technology | Literature | Science | Education | Technology | Science |
| Literature | Psychology | Law | Education | Law | Education |

a. Obtain a bar chart using relative frequency on the vertical axis.

b. Obtain a pie chart for this data set.

c. Do you think the York University should try to acquire more books in one particular subject area? Why or why not?