**Quantitative Methods**

**List of Exercises N. 1**

**Selected Exercises from McClave (2014) – Chapter 2**

**2.2 Graphical Methods to describe Quantitative Data**

1. (24, SANIT). ***Sanitation inspection of cruise ships***. To minimize the potential for gastrointestinal disease outbreaks, all passenger cruise ships arriving at U.S. ports are subject to unannounced sanitation inspections. Ships are rated on a 100-point scale by the Centers for Disease Control and Prevention. A score of 86 or higher indicates that the ships is providing an accepted standard of sanitation. The latest (as of Jan. 2010) sanitation scores for 186 cruise ships are saved in the accompanying file. The first 5 and last 5 observations in the data set are listed in the accompanying table.



1. Generate both a stem-and-leaf display and histogram of the data.
2. Use the graphs to estimate the proportion of ships that have an accepted sanitation standard. Which graph did you use?
3. Locate the inspection score of 69 *(Albatross)* on the graph. Which graph did you use?

2. (26, NFL). ***Most valuable NFL teams***. Each year, Forbes reports on the value of all teams in the National Football League. Although England’s soccer team, Manchester United, is the most valuable team in the world (1.8 billion USD), the NFL now has 15 teams worth at least 1 billion USD. For 2011, Forbes reports that the Dallas Cowboys are the most valuable team in the NFL, worth 1.85 billion USD. The current values in millions of USD of all 32 NFL teams, as well as the percentage changes in the values from 2010 to 2011, debt-to-value ratios, annual revenues, and operating incomes are listed in the table of the file NFL.

1. Use a graph to describe the distribution of current values for the 32 NFL teams.
2. Use a graph to describe the distribution of the 1-year change in current value for the 32 NFL teams.
3. Use a graph to describe the distribution of debt-to-value ratios for the 32 NFL teams.
4. Use a graph to describe the distribution of the annual revenues for the 32 NFL teams.
5. Use a graph to describe the distribution of operating incomes for the 32 NFL teams.
6. Compare and contrast the graphs, parts a – e.

3. (28, WRKCTR). ***Items arriving and depending at work center****?* In a manufacturing plant, a work center is a specific production facility that consists of one or more people and/or machines and is treated as one unit for the purpose of capacity requirements for planning and job scheduling. If jobs arrive at a particular work center at a faster rate than they depart, the work center impedes the overall production process and is referred to as a bottleneck. The data in the table were collected by an operations manager for use in investing a potential bottleneck work center. Construct dot plots for two sets of data. Do the dot plots suggest that the work center may be a bottleneck? Explain.

**2.3 Numerical Measures of Central Tendency**

4. (47, HCOUGH). ***Is honey a cough remedy?*** Refer to the Archives of pediatrics and Adolescent Medicine (Dec. 2007) study of honey as a remedy of coughing. 105 ill children in the sample were randomly divided into 3 groups: those who received a dosage of an over-the-counter cough medicine (DM), those who received a dosage of honey (H), and those who received no dosage (control group). The coughing improvement scores (as determined by the children’s parents for the patients are reproduced in the table below:



1. Find the median improvement score for the honey dosage group.
2. Find the median improvement score for the DM dosage group.
3. Find the median improvement score for the control group.
4. Based on your results, what conclusions can pediatric researches draw?

5. (48, BIODEG). Refer to the Journal of Petroleum Geology (April 2010) study of the environmental factors associated with biodegradation in crude oil reservoirs. The amount of dioxide (milligrams / liter) and the presence / absence of crude oil was determined for each of 16 water specimens collected from mine reservoir. The data are repeated in the accompanying table:



1. Find the mean dioxide level of the 16 water specimens. Interpret this value.
2. Find the median dioxide level of the 16 water specimens. Interpret this value.
3. Find the mode dioxide level of the 16 water specimens. Interpret this value.
4. Find the median dioxide level of the 10 water specimens with no crude oil present.
5. Find the median dioxide level of the 6 water specimens with crude oil present.
6. Compare results d and e. Make a statement about the association between dioxide level and presence / absence of crude oil.

6. (50, PGA). ***Ranking driving performance of professional golfers***. A group of Northeastern University researchers developed a new method for ranking the total driving performance of golfers on the professional Golf Association (PGA) tour (The Sport Journal, Winter 2007.)The method requires knowing a golfer’s average driving distance (yards) and driving accuracy (percent of drives that land in the fairway). The values of these two variables are used to compute a driving performance index. Data for the top 40 PGA golfers (as ranked by the new method) are saved in the accompanying file. The first five and last five observations are listed in the table below.



1. Find the mean, median and mode for the 40 driving performance index values.
2. Interpret each of the measures of central tendency. Part a.
3. Use the results of a to make a statement about the type of skewness in the distribution of driving performance indexes. Support your statement with a graph.