**PROJECT ONE**

The objective of this project is to use a variety of visual representations of data – including bar graphs, pie charts, line graphs, and stackplots – to identify and display key properties of data sets. This project will also require interpreting and drawing conclusions from such visual representations of data.

Additionally, a major component of this project is utilizing several important functions within standard spreadsheet software, such as Microsoft Excel. *Please note that developing proficiency with such software is required for the successful completion of this project and may take considerable time and effort if you do not already have extensive familiarity such software.*

A spreadsheet file containing the data sets required for this project must be downloaded from the NAU MAT 114 course website. The file is located on the “Projects” tab of the course website and is referred to in this project as “the accompanying spreadsheet.”

All required charts/graphs **must** be created within a spreadsheet program. Handwritten or hand-drawn charts/graphs will not be accepted.

Answers to the following questions must be compiled into a single word-processing document (Microsoft Word, etc.), including necessary explanatory text and supporting charts/graphs. This final document must be neat and organized, with answers to individual problems clearly labeled. The method of submission of the final document (i.e. printed out, submitted electronically, etc.) will be determined by individual instructors.

Explanations of common visual representations of data are provided in Section 1B of the NAU MAT 114 course website. **Section 1B** also contains several videos demonstrating how to create such representations within the Microsoft Excel spreadsheet program.

This project must be submitted **prior** to the start of your Class Meeting during Week 3 of this semester.
**Purchasing Power Parity**

1. In many economic theories, *purchasing power parity* is a technique used to determine the relative value of different currencies. While economists often consider the relative value of complex collections of goods, another method of estimating purchasing power parity is to compare the price of a single common item in various countries.

Data provided in the accompanying spreadsheet indicates the *Big Mac Index* for selected countries in three geographic regions (North and South America, Asia, and Europe). The Big Mac Index compares the price of a Big Mac hamburger at McDonald’s restaurants in different countries, indicating the percentage above or below the average price of a Big Mac in the United States – if a country’s Big Mac Index is 17, for example, then the price of a Big Mac in that country would be 17% more than the price in the United States. (If you are interested in more details, view the full article [here](#)).

One common way of visually representing data which is broken into distinct groups is with a *bar graph*.

a) Create a *bar graph* which displays the Big Mac Index for the given countries in North and South America.

   *Note: Many spreadsheet programs (including Microsoft Excel), refer to a bar graph as a “Column Chart.”*

b) Create a *bar graph* which displays the Big Mac Index for the given countries in Asia.

c) Create a *bar graph* which displays the Big Mac Index for the given countries in Europe.

The accompanying spreadsheet also indicates the average price of a 16GB iPad (with WiFi and Retina display, reported in September, 2014) in selected countries. At the time the data was compiled, the price of an equivalent iPad in the United States was $499.

d) For each of the given countries, calculate an “iPad Index” value – that is, calculate the percentage by which each country’s iPad price differs from the United States’ price of $499, displaying the iPad Index value in a column to the right of the existing data.

e) Create a *multi-bar graph* which displays both the Big Mac Index and the iPad Index for the given countries in North and South America.

f) Create a *multi-bar graph* which displays both the Big Mac Index and the iPad Index for the given countries in Asia.

g) Create a *multi-bar graph* which displays both the Big Mac Index and the iPad Index for the given countries in Europe.

h) Identify at least three countries in which a Big Mac is *cheaper* than in the United States, but in which an iPad is *more expensive.*
**NBA Scoring Leaders**

2. Data provided in the accompanying spreadsheet indicates the Scoring Champion for each season in the history of the National Basketball Association (NBA). The title of Scoring Champion is awarded to the player with the highest points per game average over the course of a sufficient number of games.

One common way of visually representing the change of some quantity over time is with a *line graph*.

a) Create a *line graph* displaying the *Points per game* value for the NBA Scoring Champion for the given seasons.

b) Based on line graph you just created, what appears to be the typical *Points per game* value for a Scoring Champion? Has a player ever averaged significantly higher than this typical value? Which player(s)? In which season(s)?

Note that the total points scored by each player consist of points scored in distinct categories: points from *Free Throws*, *2-pointers*, and *3-pointers*. (The 3-point shot was introduced in the 1979-80 season, so players prior to that season could not score points in that category.)

One common way of visually representing data which changes over time and in which several categories make up an overall whole is with a *stackplot*.

c) Create a *stackplot* displaying how each Scoring Champion’s total points are comprised of *Free Throws*, *2-pointers*, and *3-pointers*.

*Note: Many spreadsheet programs (including Microsoft Excel), refer to a stackplot as a “Stacked Area” chart.*
**ALTERNATIVE FUELS**

3. The number and variety of alternative fueling stations has grown significantly in recent years in the United States. Data provided in the accompanying spreadsheet was gathered by the United States Department of Energy and shows fueling station counts for the top 10 states.

a) Create a column which calculates the total number of fueling stations in each state under consideration.

b) Create a *pie chart* which displays the data for the total number of fueling stations.

c) Create a *bar graph* which displays the data for the total number of fueling stations.

d) Discuss which of the two visual representations you just created is a more effective representation of this data set.

e) Create a row which calculates the total number of stations within each category.

f) Create a *pie chart* which displays the data for the total number of stations within each category.

g) Create a *bar graph* which displays the data for the total number of stations within each category.

h) Discuss which of the two visual representations you just created is a more effective representation of this data set.

In addition to counts of fueling stations which are available within each state, the accompanying spreadsheet also provides the population of the states under consideration.

i) Create a column which calculates the population of each state divided by the total number of fueling stations available within that state.

*Note that this value indicates the number of people “per fueling station.”*

j) Which three states are the “best” at providing alternative fueling stations?
**STARBUCKS**

4. Data in the accompanying spreadsheet tracks the number of Starbucks stores in the U.S., as well as the total count worldwide, between the years 1999 and 2012. Additionally, the spreadsheet provides the total annual revenue for Starbucks from 2001 to 2012.

A *stackplot* (also called an *area graph*) displays proportional relationships between quantities over time.

a) Create a stackplot which represents the relationship between Starbucks’ Total Number of Stores and Total U.S. Stores over the period from 1999 to 2012.

b) Based on the stackplot you just created, in which year does it appear that U.S. stores comprised the smallest *percentage* of total Starbucks stores worldwide?

c) Create a column which calculates the percentage of total Starbucks stores which are located in the U.S. in each of the years under consideration.

d) Create a *line graph* displaying the percentage data you just created.

e) Create a *line graph* displaying the Total Annual Revenue data.

f) Based on the line graphs you just created, discuss trends you see regarding the percentage of total Starbucks stores which are located within the U.S. and the company’s Total Annual Revenue.