ENGR 0011 – Fall 2018
HW 6 – How bad is traffic?

Acceptable behaviors for this assignment include:

- Consulting your textbook or other written material
- Asking your team members
- Asking your professor or TA

Note that consulting materials and asking others is only acceptable as long as they do not provide you with the solutions – you have to come to the solution on your own!

Unacceptable behaviors for this assignment include:

- Copying the solution(s) from a solution manual, book, other written material, or from other students
- Copying the solutions(s) from assignments submitted in previous semesters
- Providing the solutions to a classmate, student in other section, student in future section, or online solution banks
- Asking someone to complete the assignment for you

For many people across the world a significant amount of their time is spent commuting every day. For those commuting via cars that means dealing with traffic. Traffic challenges in the US are notorious; check out this article about the city of Los Angeles ranked number one for traffic congestion (http://www.latimes.com/local/lanow/la-me-la-worst-traffic-20180206-story.html). In this assignment you will be using data from the US Census on commute times to compare the *average commute times* between the states of Pennsylvania and California. The file list the *average commute times* for each of its townships. There are about 1,600 data points for each state.

You will need to download two data files "PA_AvgCommuteTimes" and "CA_AvgCommuteTimes" from courseweb.

Sheet 1: Name Sheet 1 "Stats" and follow the instructions below.

For the California data set please find the following:

- The mean of the commute times (using the built-in Excel Function)
- The mean of the commute times (without using the built-in Excel Function for mean. You may use other built-in Excel functions)
- The median of the commute times using any method you'd like
- The standard deviation of the commute times (using the built-in Excel Function)
- The standard deviation of the commute times (without using the built-in Excel for std. dev. You may use other Excel functions)

Please repeat the above steps for the Pennsylvania data set.

Sheet 2: Name Sheet 2 "Histograms" and follow the instructions below.

1. Using bin intervals of 10 minutes you will create two Histograms using two different methods to show the **California commute times** (mins) vs. the relative frequency (%). Note: the relative frequency is the percentage of samples that are represented in that bin.

- For the first method you will create the Histogram using the built-in Histogram function.
- For the second method you will create the Histogram from scratch using the function COUNTIF to separate them into each of their bins. The first few rows of your table to create this Histogram will look like the following:

Bins	Using COUNTIF	Relative %
10	20	1.24%
20	201	12.5%

2. Please create the same two Histograms using the two different methods for the **Pennsylvania commute times**. You should place the results on the same sheet.
3. Please create the same two Histograms using the two different methods of the combined **Pennsylvania & California commute times**. You should place the results on the same sheet.

Sheet 3: Name Sheet 3 "Analysis" and follow the instructions below.

In this sheet please type out the following questions and your group's responses to them.

1. Based on the data is the "average commute time" between PA and CA different? Does this surprise you? If so why?

2. Based on all the commute data available to you, would your team prefer to have PA or CA commute times? Discuss and Explain your answer.

3. Is using the "average commute time" the best way to compare commuter traffic between PA and CA? If not what other parameters would you recommend? Variance? Range? Discuss and Explain.

This is a team assignment. Upload the Excel file through your class computer using the official file submission link (found on the desktop of class computers in GSCC 138 or BEH 229 at the beginning of the class when this assignment is due). The file should be named Assign-6-TeamName (e.g. Assign-6-L03).