DSCC 201/401 Homework Assignment #7
Due: **November 24, 2021 at 9 a.m. EST**

Answers to these questions should be submitted via Blackboard. Use a Python notebook running on Jupyter to answer the questions below. Please upload TWO files to Blackboard a Python notebook (.ipynb) with the correct responses and a PDF file of the Python notebook showing all input and outputs. Answer the questions directly in the Python notebook using comments or markdown cells. Use the Python 3 (anaconda3 2019.3) kernel on BlueHive for this assignment. Please make sure your name is typed at the top of the file.

1. Write a Python function (called `mymin`) that takes a NumPy array as input and returns a tuple containing two elements. The first element is the minimum value of the array and the second element is the number of times the minimum value appears in the array. Please write your own code to find the minimum value. Do **not** simply use the built-in min() function.

2. Read in the file `/public/bmort/python/numbers.pkl` to a NumPy array called `numbers`. What is the output of `mymin(numbers)`?

3. Load the file `/public/bmort/python/weather.csv` into a Pandas data frame. Perform the following tasks and answer the questions below:

    a. The amount of rain recorded in the PREC column is measured in inches. Append a column to the data frame that represents the amount of rainfall in centimeters. Remember to retain the T notation to indicate a trace of rain. Make sure to show all code to append this column to the data frame. Refer to the Pandas documentation as needed.

    b. What was the minimum high (HI) temperature during the month of July?

4. Using the mtcars data set (located at `/public/bmort/python/mtcars.csv`) perform the following tasks and answer the questions below:

    a. Using Scikit-Learn's `LinearRegression()`, construct a model to predict the fuel efficiency of the set of cars (`mpg`) in the data set as a function of the horsepower (`hp`) of the engines in the cars.

    b. Plot the data points in the data set and your linear model using Pyplot.

    c. What is the predicted fuel efficiency of a car that has a horsepower of 130?