**QMB 6358: Software Tools for Business Analytics**
Executive Development Center
College of Business
University of Central Florida
Fall 2020

# Assignment 2

Due Wednesday, September 16, 2020 at 11:59 PM
in your GitHub repo.

**Instructions:**

Complete this assignment within the space on your GitHub repo in a folder called `assignment_02`. In this folder, save your answer to Question 1 in a file called `Q1_functions.R`. In the same folder, save a copy of the sample file called `Q2_testing.R` that will contain your R code for Question 2. Test your scripts by running the shell script `A2_run.sh`, which will output the results of the tests.

When you are finished, submit your code by pushing your changes to your GitHub repo. You are free to discuss your approach to each question with your classmates but you must `git push` your own work.

**Question 1:**

Create functions to perform the following calculations. Insert your function definitions in the file `Q1_functions.R` from the `assignment_02` folder in the QMB6358F20 course repository.

For each example, there are at least two solutions. One is to use a `for` loop and the other is to use arithmentic operations on the inputs in vector form. For your examples, a vector can be created with the `c()` function, as in `x <- c(1, 2, 3, 2, 2)`. It is fine to choose simple examples to test your function that you can work out by hand, as long as they test that the function works correctly.

a) Write a function `sum_sq_dev` that takes in a vector `x` and a number `mu` and returns the sum of the squared deviations from the numbers in `x` and the number `mu`. That is, calculate the following formula:

$$SSD(x, \mu) = \sum_{i=1}^{n} (x_i - \mu)^2$$

b) Calculate the covariance between two vectors `y` and `x`, of equal length $n$, and return this as the output from the function `covar_y_x`. That is, calculate the following formula:

$$COV(y, x) = \frac{1}{n} \sum_{i=1}^{n} (y_i - \bar{y})(x_i - \bar{x})$$

**Question 2:**

Using the examples you created in the function design recipes for the functions in Question 1, test your library of functions.

1. Enter the examples in a script called `Q2_testing.R` to read in your library of functions from the script `Q1_functions.R`.
2. Run the shell script `A2_run.sh`, which will output the results of the tests.
3. Check whether the results are correct. If there are any errors or incorrect calculations, make adjustments and run the shell script again.

**Question 3:**

Push your completed files to your GitHub repository following these steps. See the `README.md` in the folder `demo_04_version_control` in the QMB6358F20 course repository for more instructions.

1. Open GitBash and navigate to the folder inside your local copy of your git repo. Any easy way to do this is to right-click and open GitBash within the folder in Explorer.
2. Enter `git add .` to stage all of your files to commit to your repo. You can enter `git add my_filename.ext` to add files one at a time, such as `my_filename.ext`. in this example.
3. Enter `git commit -m "Describe your changes here"`, with an appropriate description, to commit the changes. This packages all the changes into a single unit and stages them to push to your online repo.
4. Enter `git push origin master` to push the changes to the online repository. After this step, the changes should be visible on a browser, after refreshing the page.