CS 441 – Fall 2019
Assignment #3
Due: 10/23/2019

For this assignment you will be creating two programs: one program that will make use of the enumeration type; and a revised Assignment #1 that will use Arrays/Pointers. The programming languages we will use for this assignment are Java and C/C++. For each program you will also be submitting analysis in the form of a report as described below.

1. Write a program that calculates the change for a given transaction. For this program, assume that only the following denominations are valid amounts to be returned to the user: dollar (1.00), quarter (0.25), dime (0.10), nickel (0.05), and penny (0.01). The amounts **must** be stored as an enumeration in each respective language. Change must be calculated using recursion and should return the least number of coins possible.

   Below is example of a sample program run (**BOLD** = User Input):

   ```
   Please enter the cost of an item: $10
   Please enter the amount paid: $11.50
   Changed Returned: 1 – dollar, 2 – quarters, 0 – dimes, 0
   – nickels, 0 – pennies
   ```

   Report: Compare and contrast the implementation and use of enumerations in each language. A discussion of both the syntax and semantics should be included here. In this comparison and analysis you should also clearly outline which language you prefer for this feature (using the four metrics as described in lecture as your guide).

2. Using the first assignment as your template – rewrite the C/C++ version to use pointers explicitly. The input and subsequently sorted "list" of numbers must be stored as an Array. In both program instances (C/C++ and Java), the "array" of numbers must be stored on the Heap. You should have no memory leaks in either program. All of the other requirements from Assignment #1 hold (for the programming component).

   Report: Compare and contrast the implementation and use of pointers and Arrays in each language. You need to discuss the relationship between these in C/C++ and how Java provides a similar implementation "under the hood." In this comparison and analysis you should also clearly outline which language you prefer for this feature (using the four metrics as described in lecture as your guide).

Development Process:

The code must compile and run on Thomas (**thomas.butler.edu**). You should use good software design principles when creating your program – this includes the presence of comments throughout your code. Failure to do so will result in a lower score.

You are expected to submit a "professional" report with this submission (either a PDF or a Word document). This report should include answers and discussion to the above listed questions.

Make sure to include the Honor Pledge and Digital Signature in your source files! Failure to do so will result in a deduction of points.

Submission:

All assignments must be submitted on Butler GitHub (**github.butler.edu**). The name of your Butler GitHub repository must be as follows: **cs441_fall2019**

Make sure your repository is **private** and that I (**rrybarcz**) am added as a collaborator. Failure to do so will result in a loss of points.

The following assignment should be done individually. All work is expected to be your own.