CS 501B – Introduction to JAVA Programming
Fall 2022 Semester
Due: 9/30/2022 Friday at 11:59 PM

Instructions:

1) You are not allowed to use any package/library unless stated otherwise.
2) We will provide you a skeleton Assignment1.java file with a few test cases.
3) You are required to make the necessary changes in Assignment1.java file.
4) We will be testing your code on other hidden test cases.
5) Please comment your name and CWID in the first two lines of the Assignment1.java file.
6) You are required to zip the Assignment1.java file as FirstName_LastName_Assignment#.zip (Ex: Suhas_HS_Assignment1.zip).
7) This assignment covers topics from weeks 3 and 4.
8) Students are not allowed to collaborate with classmates and any other people outside. All work must be done individually. Any work having evidence of showing academic dishonesty violation are subjected to give zero for the assignment.

Mathematical Operations:

1) Given the coefficients of a Quadratic Equation, find the array of roots of the equation. You may assume that the equation will always have real roots. Round the roots to three Decimal places. Return the roots in an array of size 2. Write a method ***public static double[] quadraticEquation(double a, double b, double c)*** to implement this. You may use Math library **only** for this question. (5 Points)
2) Given points x1, y1, x2, y2, find the Euclidian distance between the points (x1, y1) and (x2, y2). You may use Math library **only** for this question. Round the answer to three Decimal places. Write a method ***public static double euclidianDistance(double x1, double y1, double x2, double y2)*** to implement this. (5 Points)
3) Given an array, find the maximum, the minimum, average and total sum of all the elements. Return the answer in an array of size 4 with each slot corresponding to each answer. Write a method ***public static double[] arrayOperations(double[] a)*** to implement this. (10 Points)

Methods:

1) Write a method to reverse a given string. You are required to return the reversed string. Write a method ***public static String strReverse(String a)*** to implement this. **You are not allowed to use any inbuilt functions for string reversal.** (10 Points)
2) Using **strReverse(string a)** write another method to check if a given string is a palindrome. A palindrome is a word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run. You are required to return a Boolean value. Write a method ***public static boolean checkPalindrome(String a)*** to implement this. (5 Points)

1D Array:

1) Given a string, calculate the occurrence of each character and store the count in an array. The length of the output array must be 26 with each slot corresponding to each alphabet. For example ‘a’ will correspond to array[0], ‘b’ will correspond to array[1] and so on. You may assume that the string consists of only lowercase characters and no spaces. Write a method called ***public static int[] strCounter(String a)*** to implement this. (20 Points)

MD Array:

1) Given a matrix, find the transpose of a matrix. You are required to return a 2-D array. Write a method called ***public static int[][] transpose(int[][] a)*** to implement this. Hint: If the input matrix are of dimensions M x N, then the output matrix dimensions will be N x M. (20 Points)

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2) Given two matrices of dimensions M x N and N x K find the product of the two matrices. You are required to return a 2-D array. Write a method called ***public static int[][] matMul(int[][] a, int[][] b)*** to implement this. Hint: If the input matrices have the dimensions M x N and N x K, then the output array dimension will be M x K. (25 Points)