Assignment 5

Recursion

Introduction

In this assignment, you will use recursion to solve a number of problems. In Part 1, you will get some experience writing recursive solutions that operate on an array, and in Part 2 you will solve problems recursively working with a stack.

Although there is a tester provided for this assignment, it does not include a comprehensive set of sets for each method. You should add your own tests for any test cases not considered.

NOTE: The automated grading of your assignment will include some different and additional tests to those found in the `A4Tester.java` file. For all assignments, you are expected to write additional tests until you are convinced each method has full test coverage.

Objectives

Upon finishing this assignment, you should be able to:

- Write recursive methods that operate on arrays
- Write recursive methods that operate on stacks
- Use a context-preserving accumulator in a recursive solution

Submission and Grading

Attach `A5Exercises.java` to the BrightSpace assignment page. Remember to click **submit** afterward. You should receive a notification that your assignment was successfully submitted.

If you chose not to complete some of the methods required, you **must** provide a stub for the incomplete method(s) in order for our tester to compile. If you submit files that do not compile with our tester, you will receive a zero grade for the assignment. It is your responsibility to ensure you follow the specification and submit the correct files. Additionally, your code must not be written to specifically pass the test cases in the tester, instead, it must work on all valid inputs. We may change the input values during grading and we will inspect your code for hard-coded solutions.

Be sure you submit your assignment, not just save a draft. All late and incorrect submissions will be given a zero grade. A reminder that it is OK to talk about your assignment with your classmates, but not to share code electronically or visually (on a display screen or paper). Plagiarism detection software will be run on all submissions.

Instructions

Part 1:

1. Download all of the `.java` files found in the *Assignments* > *Assignment 5* page on BrightSpace.
2. Read through the tests provided in `A5Tester.java`.
3. Compile and run `A5Tester.java`. Work through implementing each method one at a time. Debug the method until all of the tests pass for that method before proceeding to the next method.
4. **Remember:** You must solve each problem recursively. There must not be any `for` or `while` loops in your solution, or you will receive a grade of 0.

Part 2:

1. Read the documentation provided in `Stack.java`. When using a stack to solve a problem, you can only use the methods specified in the stack interface.
2. Read through the stack implementation `A5Stack.java`. Notice there are no loops necessary in the implementation of a stack. All methods run in $O(1)$ time.
3. Compile and run `A5Tester.java`. Work through implementing each stack method one at a time. Debug the method until all of the tests pass for that method before proceeding to the next method.
4. **Remember:** You must solve each problem recursively. There must not be any `for` or `while` loops in your solution, or you will receive a grade of 0.

CRITICAL: Any compile or runtime errors will result in a **zero grade** (if the tester crashes it will not be able to award you any points for any previous tests that may have passed). Make sure to compile and run your program before submitting it!