CS526

Homework Assignment 6

Due: 10/31

The first two problems are about the stack and the queue data structures that are described in the textbook.

Problem 1 (10 points). Suppose that you execute the following sequence of operations on an initially empty stack. Using Example 6.3 in the textbook as a model, complete the following table.

Operation	Return Value	Stack Contents
push(8)		
push(5)		
push(10)		
pop()		
size( )		
push(3)		
top( )		
pop( )		
pop( )		
pop()		
isEmpty( )		

Problem 2 (10 points). Suppose that you execute the following sequence of operations on an initially empty queue. Using Example 6.4 in the textbook as a model, complete the following table.

Operation	Return Value	Queue Contents (first ← Q ← last)
enqueue(10)		
enqueue(12)		
dequeue( )		
first( )		
enqueue(3)		
enqueue(1)		
dequeue( )		
first( )		
enqueue(11)		
dequeue( )		
dequeue( )		
isEmpty( )		

Problem 3 (10 points). This problem is a programming problem.

Write a Java program or a Python program named *Hw6_p3.java* or *hw6_p3.py*, which implements the following requirements:

- Your program must read a sentence from an input file named *hw6_sentence.txt*.
- Your program must print on the screen all words in the sentence in the reverse order and all characters in each word must also be reversed. For example, if the input file has the following sentence:

```
The primary analysis tool we use in this book involves characterizing the
running times of algorithms and data structure operations
```

Then, your output on the screen must be:

```
snoitarepo erutcurts atad dna smhtirogla fo semit gninnur eht gniziretcarahc
sevlovni koob siht ni esu ew loot sisylana yramirp ehT
```

- Your program must reverse the order of words (in the file) and the order of characters (in each word) using **only stacks** and the reversal must be done by your own program. You should not use any built-in functions.
- You must use at most two stacks.

- For Java: You must use our textbook's *ArrayStack* class to create and use stacks. You must not use Java's *Stack* class.
- For Python: You must use the *ArrayStack* class defined in *array_stack.py*, which is posted on Blackboard, to create and use stacks.

Grading

Problem 1 (10 points):

- Up to 8 points will be deducted for wrong answers.

Problem 2 (10 points):

- Up to 8 points will be deducted for wrong answers.

Problem 3 (10 points)

- If your program does not compile, 8 points are deducted.
- If your program compiles but causes a runtime error, 6 points are deducted.
- If there is no output or output is completely wrong, 6 points are deducted.
- If your output is partially wrong, up to 6 points are deducted.

Deliverable

You must submit the following two files:

- Include your answers to Problem 1 and Problem 2 in a single word file or pdf file and name it *LastName_FirstName_hw6_p1_p2.docx* or *LastName_FirstName_hw6_p1_p2.pdf*.
- *Hw6_p3.java* or *hw6_p3.py*.