CSC 2720: Data Structures
Lab 8

Instructor: Shiraj Pokharel

Due : @ 11:00 PM ET , Next Day after release

Answer the below questions. You may use whatever IDEs / editors you like, but you must submit your responses on iCollege as .java files.
Failure to comply with this simple requirement will result in a score of Zero. Please, be careful not to be assigned a Zero score this way.

Few Rules to be followed, else will receive a score of ZERO

(1) Your submissions will work exactly as required.

(2) Your files shall not be incomplete or worse corrupted such that the file does not compile at all. Make sure you submit a file that compiles.

(3) Your submission will show an output. Should you recive a Zero for no output shown do not bother to email me with "but the logic is perfect" !

Note that your program's output must **exactly** match the specs(design , style) given here for each problem to pass the instructor's test cases .
Design refers to how well your code is written (i.e. is it clear, efficient, and elegant), while *Style* refers to the readability of your code (commented, correct indentation, good variable names).

In today's Lab we will explore on ways to design a simple calculator that simplifies calculations and returns an answer to the expression.

Below is how the expression is represented. This expression is also known as an "in-fix" expression

10 * (2 + 15) / 17

Here you have to remember that parentheses and operators have precedence, where some sub-expressions need to be calculated earlier than other sub-expressions. Further, there are space(s) between operands/operators in the expression. So

your solution needs to think of these aspects.

You will solve the problem as stated below:-

(1) [90 points] Design a simple calculator that helps you solve the expression given. For your assistance you can use the Stack class provided in java. URL reference here:

https://docs.oracle.com/javase/7/docs/api/java/util/Stack.html

Please be reminded that you need to design the calculator and not use in-built math methods from the Java library to solve the expression. Doing So would lead to a straight score of Zero ! Also at the end of the program as a comment mention the time and space complexity of your solution. Time and space complexity is worth 15 points each !

(2) [10 points] In the form of sentences, as a comment in your code (at the bottom of your program), you are required to suggest how will *Solution*1 be affected by using the ArrayDeque class from the Deque **interface** instead of Java's Stack class. URL reference here:

https://docs.oracle.com/javase/8/docs/api/java/util/Deque.html

Your suggestion should be no more than 5 sentences. If you think there is no meaningful improvement in time and space complexity and Deque interface is just a programming best practice, then kindly state so by your affirmation of use of which is better. :)

P.S : I know I have not taught you the Deque interface in class. This exercise is mainly to persuade you into self-studying Java's API Docs.

Very Very Important :

(1) Your code should be well commented which explains all the steps you are performing to solve the problem. A submission without code comments will immediately be deducted 15 points !

(2) As a comment in your code, please write your test-cases on how you would test your solution assumptions and hence your code.
A submission without test cases (as comments) will immediately be deducted 15 points ! Please Remember : Although, written as comments - You will address your test cases in the form of code and not prose :)