Lab 03 - Basic Data Structures

Before you come to the lab

1. Read this document carefully to properly prepare for the lab and turn in your lab solution (i.e., your lab report as per the instructions presented here).
2. Read Sections 3.1-3.9.3 of the textbook.

Prelude

You will be creating test cases for this lab. Therefore, as per the guidelines provided in the testing in Python website (https://realpython.com/python-testing/), create the following folder for your lab03:

```
lab03/
│
├── mySolution/
│   └── __init__.py
└── test.py
```

- `__init__.py` should contain your python function definitions for this lab assignment
- `test.py` should contain your tests.

Exercise

- Implement a `infixToPostfixEval` function that takes in a string representing a mathematical expression in infix notation and returns two things: a string representing the expression in postfix notation and its value. Valid operands consist of the digits 0 to 9, and operators are the operators `(`, `)`, `+`, `–`, `*`, `/`, and the unary factorial operator `!`. Assume there are no errors, i.e., invalid or misplaced operands or operators, in the input string. Implement `infixToPostfixEval` as a direct infix evaluator that combines the functionality of the `infixToPostfix` function and the postfix evaluation algorithm provided in the texbook. Your `infixToPostfixEval` should process infix tokens from left to right and, while processing those tokens, use two stacks, one for operators and one for operands, to perform the evaluation. For example:

  ```
  x,y = infixToPostfixEval('( 2 + 2 ) ! + 8')
  print(x, "\nEvaluates to: ", y)
  ```

  Outputs

  ```
  2 2 + ! 8 +
  Evaluates to:  32
  ```

- In `test.py`, create at least five (5) test cases for `infixToPostfixEval`.

Preparing to submit your report

1. Ensure you have structured your `lab03` folder as indicated in Section Prelude above.
2. Create a zip file of your `lab03` folder.

What to submit

At the Lab web page in D2L, click on `Lab Solution Submission`, then attach and submit **only the zip** file you have created as per the instructions above.