

Python for data scientists SP1 2021/2022

Assignment 5

There are two problems in this assignment.

You can either submit:

- One Python file for Problem 1 (solutionA5_P1.py)
- One Python file for Problem 2 (solutionA5_P2.py)
- A PDF file for the explanation part (if any).

Or a Jupyter Notebook with clearly marked solutions for which problems/which tasks and any explanation.

Note: If you add any details or make any assumptions, please clearly describe in your submission.

Problem 1

Palindrome is “a word, verse, or sentence (such as "Able was I ere I saw Elba") or a number (such as 1881) that reads the same backward or forward”, based on the definition from Merriam Webster dictionary.

The task here is to write a program that uses both stack and queue data structures (in the same program) to check if the given input is a palindrome.

Requirement specification:

- Use both stack and queue in the program
- Maximum size of the stack: half the size of the input rounded down.
- Maximum size of the queue: half the size of the input rounded up.
- The program should handle different types of inputs, e.g., Integer and string.

Problem 2

Your client wants to build a new text editor for a new language. The text editor should warn users when there are missing matching brackets, parentheses, braces or missing any special characters which are supposed to be used as pairs. The special characters are referring to those listed below (they are used for defining math mode, similar to those in LaTeX):

$\$ \dots \$, \backslash[\dots \backslash], \backslash\{ \dots \backslash\}, | \dots |, \backslash| \dots \backslash|$

Note that $\backslash\$$ can be used as singles (doesn't have to be as a pair), for example when we want to use that to represent US Dollars.

Before giving you the contract to help building a complete text editor software, you are asked to create a basic software that given an input string should give an output True or False in

terms of if the string has matching brackets/parentheses/braces/those specified special characters. Some input examples are given below. The company will also test your code with other input, please be prepared.

```
if __name__ == '__main__':
    print(check_matching_special_chars("() (l[k][k]))"))
    print(check_matching_special_chars("[[] (9)l)l]"))
    print(check_matching_special_chars("((()"))
    print(check_matching_special_chars("() [] {}"))
    print(check_matching_special_chars("(5[] [7] ())"))
    print(check_matching_special_chars("[[[ [3]]]"))
    print(check_matching_special_chars(""))
    print(check_matching_special_chars("\[3+4"))
    print(check_matching_special_chars("It costs $3."))
    print(check_matching_special_chars("$\frac{1}{2}+5$"))
```

Output:

```
False
False
False
True
True
True
True
True
False
True
True
```