Data Structures

Stack Homework #2

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Problem #1: Manual System Stack

- **Background**: We know a recursive function will have its calls stored in a stack. Sometimes, we can't use the default system stack as the function is so deep (e.g. facing a possible stack overflow)
- If we tried to call f(100000), we will get an exception
- *As this is a simple recursion, we can write a trivial iterative solution*
- In this task, write a **stack-based** code to simulate the solution.
- Kind of, you are simulating the internal recursion calls done by the program for you Using the built-in stack

```
def f(n):
    if n <= 1:
        return 5
    if n % 3 == 0:
        return 6 + f(n-1-n%3)
    return 8 + f(n-1-n%2)
```

```python
if __name__ == '__main__':
    print(f(500), f_stk(500))   # 2503 2503

    #print(f(100000))     # maximum recursion depth exceeded in comparison
    print(f_stk(100000))  # 500007
```

Problem #2: LeetCode 856 - Score of Parentheses

Given a balanced parentheses string `S`, compute the score of the string based on the following rule:

- `()` has score 1
- `AB` has score `A + B`, where A and B are balanced parentheses strings.
- `(A)` has score `2 * A`, where A is a balanced parentheses string.

- Use a stack
- Inputs
  - () ⇒ 1
  - (()) ⇒ 2
  - ()() ⇒ 2
  - (()()) ⇒ 4
  - (() (())) ⇒ 6
  - ()((()) ()) ⇒ 7

Problem #3: LeetCode 739 - Daily Temperatures

Given an array of integers `temperatures` represents the daily temperatures, return *an array* `answer` *such that* `answer[i]` *is the number of days you have to wait after the* i^{th} *day to get a warmer temperature*. If there is no future day for which this is possible, keep `answer[i] == 0` instead.

- Find O(n) solution

Example 1:

```
Input: temperatures = [73,74,75,71,69,72,76,73]
Output: [1,1,4,2,1,1,0,0]
```

Example 2:

```
Input: temperatures = [30,40,50,60]
Output: [1,1,1,0]
```

Example 3:

```
Input: temperatures = [30,60,90]
Output: [1,1,0]
```

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."