Data Structures
Homework #1

Due: Oct 8, 2020

This assignment is to practice Python programming. There are five problems and please finish each problem right after the problem description in the `HW1.ipynb` file that is provided on the **i-school(Plus)** (https://istudy.ntut.edu.tw/learn/index.php) platform. More details about each problem are also in the `HW1.ipynb` file.

1. Write a short Python function `sumoddsquares()` that takes a positive integer n and returns the sum of the squares of all the odd positive integers smaller than n. Furthermore, please give a single command that computes the same sum in another Python function `sumoddsquares_simple()`, relying on Python's comprehension syntax and the built-in sum function.

2. Write a Python function `uniqueness()` that takes a sequence of numbers and determines if all the numbers are different from each other (that is, they are distinct).

3. Suppose a teacher would like to arrange the students in a row according to their heights in an increasing order from left to right. With a given sequence of heights of students, please give a way to help the teacher to decide whether the teacher can have an increasing list by rotating the list. For example, given a sequence of numbers $S = \{6, 8, 9, 3, 5\}$, S can be rotated to be an increasing list as $\{3, 5, 6, 8, 9\}$ but the other example $S' = \{1, 4, 5, 2, 3\}$ can not be an increasing list by rotations. The input of this problem thus is a sequence of numbers and the function 'rotated_increasing()' is to determine whether the input sequence can be an increasing list by rotations.

4. Write a Python class named 'Circle' constructed by a radius with two methods: 'area()' and 'perimeter()', which compute the area and perimeter respectively. For this problem, we simply use $\pi = 3.14$.

5. Create a Python program that will play the "A and B" game with a user. The game works as follow. One randomly generates a 4-digit number and asks the user to guess this 4-digit number. For every digit that the user guesses correctly in the correct place, the user gets an A. For every digit the user guesses correctly in the wrong place, the user gets a B. Every time the user makes a guess, tell them how many As and Bs the user gets. The process continues until the user guesses the correct 4-digit number and the game is over. During the process, keep track of the number of guesses the user makes throughout the game and tell the user at the end.

Homework Submission

- Please upload the completed `.ipynb` file with the filename as `HW1_studentID.ipynb` to **i-school(Plus)** (https://istudy.ntut.edu.tw/learn/index.php).

- The **deadline** is the **midnight of October 8**, 2020 and **Late work** is not acceptable.

- Honest Policy: We encourage students to discuss their work with the peer. However, each student should write the program or the problem solutions on her/his own. Those who copy others work will get 0 on the homework grade.