Final Exam

CmpE 150, Introduction to Computing, Spring 2023

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Description

For each question, you are expected to write a Python script. For each question, write your code in the corresponding file and write your code only in designated areas. Each solution will be tested using several test inputs. A solution is graded according to the tests it successfully passes.

The inputs for your questions should never be taken from the user and they are either hard-coded or randomly generated in answer files. Ensure that the last save function receives correct input (output of your program) and generates a .txt file for the output.

Grading

Question	1	2	3	4	5	6	7
Grade	20	10	20	10	15	15	10

Questions

1) Write a python program that takes an integer ‘target’ and a list of numbers ‘nums’ as input. The program must find all sublists of ‘nums’ where summation of elements of each sublist is equal to target and return these sublists in a list. The output list should not countain duplicate elements. Please not that in sublists are not subsets and order of the elements must be preserved.

Input	**Output**
12, [4, 3, 1, 5, 3, 2, 9]	[(4, 3, 5), (1, 2, 9), (4, 5, 3), (3, 9), (4, 3, 3, 2), (3, 1, 5, 3)]

2) You are given definition for a class Node and an instance of it. This node can be used to generate a data structure called as Linked List and it is very similar to regular lists. Figure out the behavior of the class and find the median of given Node instance.

Input	Output
[18, 2, 17, 3, 4, 7, 7, 8, 0]	4

3) A binary Tree is a data structure that is used in many algorithms. In the Binary Tree on the right, the initial Node is called as 'root' and it's value is 1. Each node may have a left and a right child.
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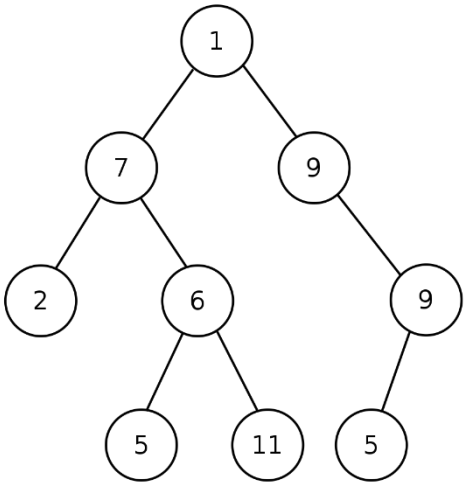

Write a python program that takes a root Node as an input, and find the sum of all Nodes in the binary that are on the path from the deepest Node from the root. If there are multiple answers, return the sum with the greatest value.

For the binary tree on the right, Nodes 5, 11 and 5 are the deepest, and they form different paths to the root Node 1. The sum of all the nodes on those respective paths are 19, 25, 24. We should return 25 because it is the maximum.

4) Write a program that takes a string 'roman' as input and return it's Arabic numeral form. The input is a roman numeral and roman numerals from 1 to 50 are as below:

1 = I 2 = II 3 = III 4 = IV 5 = V 6 = VI 7 = VII 8 = VIII 9 = IX 10 = X 11 = XI 12 = XII 13 = XIII 14 = XIV 15 = XV 16 = XVI 17 = XVII 18 = XVIII 19 = XIX 20 = XX 21 = XXI 22 = XXII 23 = XXIII 24 = XXIV 25 = XXV 26 = XXVI 27 = XXVII 28 = XXVIII 29 = XXIX 30 = XXX 31 = XXXI 32 = XXXII 33 = XXXIII 34 = XXXIV 35 = XXXV 36 = XXXVI 37 = XXXVII 38 = XXXVIII 39 = XXXIX 40 = XL 41 = XLI 42 = XLII 43 = XLIII 44 = XLIV 45 = XLV 46 = XLVI 47 = XLVII 48 = XLVIII 49 = XLIX 50 = L

Input	Output
“LXVIII”	68

5) Write a program that takes a string ‘email’ as input and return True if it is a valid email, False otherwise. The rules for a valid email are as follows:

There should be only one '@' symbol.
The email should contain at least one '.' after '@'.
There should be some characters before and after both '@' and '.'.

Input	Output
"example@example.com" "example@.com" "example@com"	True False False

6) Write a program that takes a list of tuples as input, where each tuple contains values for a person’s heigh and weight. Sort the list in non-decreasing order by BMI. Formula for BMI is: BMI = weight / (height x height)

Input	Output
[(143, 134), (163, 148), (209, 119), (211, 124), (212, 85), (190, 117), (149, 61), (149, 52)]	[(212, 85), (149, 52), (209, 119), (149, 61), (211, 124), (190, 117), (163, 148), (143, 134)]

7) Write a program that takes a string ‘password’ as input and returns True if the password is a strong password, False otherwise. A password is said to be strong if it satisfies all the following criteria:

- It has at least 8 characters.
- It contains at least one lowercase letter.
- It contains at least one uppercase letter.
- It contains at least one digit.

- It contains at least one special character. The special characters are the characters in the following string: !@#$%^&*()-+
- It does not contain 2 of the same character in adjacent positions (i.e., "aab" violates this condition, but "aba" does not).

Input	Output
“4eVer&2eTHer” "1fdaaB+r" "1fdaB+r"	True False False

Submission

Your code will be graded automatically. Therefore, it’s important that you follow the submission instructions. You will lose points if your submission does not comply with the submission rules.

First, all of your Python scripts should be collected under a folder name “final”. Then, you should zip the “final” folder and rename it to “<<student id>>”. This zip file will be submitted through Moodle. Naming of your solution must follow the convention: answer_<<question no>>.py (e.g., solution script for the 1st question should be named as answer_1.py).

Warnings

This is individual Midterm. All scripts are checked automatically for similarity with other submissions and exercises from previous years. Do not copy codes from the internet or your friends. Make sure you write and submit your own code. Any sign of cheating will be penalized, and you will get -50 points for the midterm, and you will get F grade in case of recurrence in any other work.