Instructions for hw2-programming

A. Python

You should complete this assignment using Python 3.7 or 3.8.

B. The Assignment (80 points)

You should implement the algorithms you designed for problems 1, 2, 3 and 4 in hw2t.

You should use the function names and input parameters for every function provided by Lei Duan below. Lei also provided small test cases for every problem so you can start testing your code.

IMPORTANT: Do NOT change any function names or input parameters.

Problem 1:

```
def work_life_balance(n, l, h):
    “”" Given the length n, l array and h array, you need to compute the maximized revenue V.
    n: length of both arrays.
    l: easy task revenue array.
    h: difficult task revenue array.
    Return: maximized revenue V.
    “”"
    pass
```

Input 1:

n = 3

l = [2, 2, 2]

h = [3, 3, 3]

Output 1:

7

Input 2:

n = 4

l = [2, 3, 3, 3]

h = [5, 10, 5, 5]

Output 2:

16

Problem 2:

```
def optimal_path(pyramid):
    “”" Given the pyramid, find the optimal answer and corresponding path for it.
    pyramid: the number pyramid described in the problem.
    Return: a tuple (answer, path).
        answer is the sum of the optimal route.
        path is the optimal route in the list form.
    “”"
    pass
```

Input 1:

pyramid = [[6], [3, 8], [7, 1, 0], [2, 6, 4 4]]

Output 1:

(22, [6, 3, 7, 6])

Input 2:

pyramid = [[3], [2, 1], [1, 1, 5]]

Output 2:

(9, [3, 1, 5])

Problem 3:

```
def LCS3(X, Y, Z):
    “”" Given three strings X, Y, Z, you are to find the longest common subsequence among
these three strings.
    X, Y, Z: three input strings as descrbied.
    Return: the length of LCS for these 3 strings.
    “”"
    pass
```

Input 1:

X = “abc”

Y = “bdc”

Z = “bacd”

Output 1:

2

Input 2:

X = “aaa”

Y = “aaaa”

Z = “aa”

Output 2:

2

Problem 4:

```
def max_average(n, H, g, f_list):
    “”" Given the functions and grade scale, find the optimal average grade a student can get according to the problem description.
    n: number of functions
    H: total amount of hour.
    g: grade scale.
    f_list: a list of functions
    Return: maximum average grade one can get.
    “”"
    pass
def linear(x):
    return x
def square(x):
    return x * x
def linear2(x):
    return x * 1.2
```

Input 1:

n = 2

H = 10

g = 100

f_list = [linear, square]

Output 1:

50

Input 2:

n = 2

H = 10

g = 50

f_list = [linear2, square]

Output 2:

26.3

Explanation:

If we spend 2 hours in project 1 and 8 hours in project 2, average grade is (2 * 1.2 + min(50, 8 * 8)) / 2 = 26.2

If we spend 3 hours in project 1 and 7 hours in project 2, average grade is (3 * 1.2 + 7 * 7) / 2 = 26.3

If we spend 4 hours in project 1 and 6 hours in project 2, average grade is (4 * 1.2 + 6 * 6) / 2 = 20.4

C. Your submission

Please submit your code on Gradescope under assignment hw2p.