SCIT

School of Computing and Information Technology

ASSIGNMENT 3 – PART 1

CSIT110– Programming Fundamental Using Python

Session 1: July to September 2024

INSTRUCTIONS TO CANDIDATES

1. The assignment consists of two parts. This is the part 1 of the assignment.
2. Part 2 is Moodle quiz. Should be done in class.
3. The name of the program must be **YourName_A3.**py (Only one Python file); remember to replace **YourName** by your actual "shorter" name.
4. **Total mark of Assignment 3 is 6 marks; 4 marks for Part II.**

Your program, should begin with

 # Full Name:
 # Tutorial Group
 # Declaration: …… tell me if it is your own work …. and whether you have
 # passed your program to your friends.

Objectives

- Selection and Repetition control structures
- Classes and objects
- The use of lists

Task: (6 marks)

A lot of us may wonder how they come up with the scores for a diving competition. It takes several steps to get from the judge ratings to the final scores, and the announcers are rarely eager to explain it.

Each judge rates the dive from 0 ("completely failed") to 10 ("excellent"). This is based on how well the diver performs, from his starting position to entry into the water. The judges do not take difficulty into account for this score.

- Example: a diver receives execution scores of 6.5, 7.0, 7.0, 7.5, 7.5, 8.0, and 8.0. ***Note that the score is either *.0 or *.5 (* is from 0 to 10)***

Cross out the outliers: So cross out two scores on each end: ~~6.5~~, ~~7.0~~, 7.0, 7.5, 7.5, ~~8.0~~, and ~~8.0~~, i.e., remove the two top and two bottom scores

Add the rest together. Find the sum of the remaining scores.

- Example: 7.0 + 7.5 + 7.5 = 22.0

Multiply by the degree of difficulty (DD). Each attempted dive has a degree of difficulty calculated in advance. This is based on many factors, such as the number of twists and somersaults and the take-off and entry positions. Multiply your last sum by the degree of difficulty to get the final score for this dive.

- Example: Let's say the diver attempted an inward 2½ somersault dive in the 10 meters competition, in the pike position. This has a difficulty score of 2.8. Multiply this by the execution score to get the final score: 22.0 x 2.8 = **61.6**.

In the competition, divers need to dive a few rounds, normally 5 rounds in the final.

Two important classes: `DiverInfo` and `Diving` classes.

Let us start from the `DiverInfo` class. It consists of three instance variables:

- country name (`country`)
- diver's name (`name`)
- diver's age (`age`).

A constructor to initialize the instance variables, some accessorand mutator methods method. Additional methods are allowed. Additional instance variables or any change to instance variables are not allowed. A dunder str function return a string with following format: (country is China, diver name is called Diver 2 and his / her is 25)

```
China                Diver 2                25
```

Next, let us look at the `Diving` class which is the most important class of this assignment. It consists of the following instance variables:

- DiverInfo object instance variable (`diver`)
- A list of judges scores (`score`)
- Level of difficulty (`difficulty`)
- Carried formard scores (`cf`)
- Final scores (fs)

The number of judges, usually is `7`. The list `score` stores the scores given by jdges. The level of difficulty of each round is different; `cf` (carried forward derived from the previous round, obviously round 1 has no carried forward score, i.e. 0) and fs (the final score of the current round)

Let us look at the runtime analysis:

```
Staring Position

No     Country   Name      DF
 1.    Singapore Diver 1   4.8
 2.    China     Diver 2   3.7
 3.    France    Diver 3   4.7
 4.    China     Diver 4   2.4
 5.    U S A     Diver 5   3.0
 6.    Spain     Diver 6   2.0
 7.    Brazil    Diver 7   3.9
 8.    Malaysia  Diver 8   2.1
 9.    Thailand  Diver 9   2.4
10.    Japan     Diver 10  4.5

Country   Name      Age  DF   J1   J2   J3   J4   J5   J6   J7   c/f       Total     Final
Singapore Diver 1    18  4.8  6.0  8.5  3.0  1.0  4.5  5.0  3.0  0.00      60.00     60.00
China     Diver 2    22  3.7  3.0  10.0 3.0  1.5  3.0  3.5  4.0  0.00      35.15     35.15
France    Diver 3    24  4.7  8.5  6.0  2.5  5.0  4.0  1.5  7.5  0.00      70.50     70.50
China     Diver 4    17  2.4  9.0  4.0  2.5  8.0  7.0  9.0  9.5  0.00      57.60     57.60
U S A     Diver 5    24  3.0  5.5  1.0  2.5  4.0  3.5  6.0  0.0  0.00      30.00     30.00
Spain     Diver 6    22  2.0  9.0  7.5  6.5  3.0  3.5  0.0  7.0  0.00      34.00     34.00
Brazil    Diver 7    30  3.9  3.5  9.0  8.5  9.5  9.0  8.0  4.5  0.00      99.45     99.45
Malaysia  Diver 8    24  2.1  10.0 2.0  9.5  10.0 1.0  5.0  7.0  0.00      45.15     45.15
Thailand  Diver 9    26  2.4  3.5  10.0 4.0  8.5  4.5  4.5  0.5  0.00      31.20     31.20
Japan     Diver 10   29  4.5  7.0  2.0  9.5  5.5  0.0  9.0  5.0  0.00      78.75     78.75
```

```
Rank after round 1

Rank  Country   Name      Score
 1.   Brazil    Diver 7   99.45
 2.   Japan     Diver 10  78.75
 3.   France    Diver 3   70.50
 4.   Singapore Diver 1   60.00
 5.   China     Diver 4   57.60
 6.   Malaysia  Diver 8   45.15
 7.   China     Diver 2   35.15
 8.   Spain     Diver 6   34.00
 9.   Thailand  Diver 9   31.20
10.   U S A     Diver 5   30.00
```

You can define a list of countries (can be duplicated as the same country can send at most two divers) and a list of divers' names. Ages, scores and level of difficulty are randomly generated during runtime.

In the above screen shot, you see the scores for each diver, the carried forward's score (for round 1, no carried forward score), the current score (i.e., the final score) and the total score. The total score will then be the carried forward score for the next round

Let us use an example (For example Singapore diver) to see how the total and the final scores are computed:

7 judges scores: `6.0  8.5  3.0  1.0  4.5  5.0  3.0`

If you copy the scores to a temporary list and sort them, you get:

- **1.0 3.0 3.0 4.5 5.0 6.0 8.5**
- **Find the sum of three middle scores (3.0 + 4.5 + 5.0) = 12.5**
- **Multiply by the level of difficulty: 12.5 * 4.8 = 60.0 (total score)**
- **You then add the carried forward score (0.0 for round 1) = 60.0 (final score)**

.

After each round, you need to sort the total scores and display the ranking after each round.

Let us now look at the information of Round 2:

Starting position for each round remain unchanged with different level of difficulty:

Staring Position

No	Country	Name	DF
1.	Singapore	Diver 1	3.4
2.	China	Diver 2	2.0
3.	France	Diver 3	4.8
4.	China	Diver 4	3.2
5.	U S A	Diver 5	2.6
6.	Spain	Diver 6	3.7
7.	Brazil	Diver 7	4.7
8.	Malaysia	Diver 8	3.9
9.	Thailand	Diver 9	4.7
10.	Japan	Diver 10	2.8

Country	Name	Age	DF	J1	J2	J3	J4	J5	J6	J7	c/f	Total	Final
Singapore	Diver 1	18	3.4	8.0	3.0	3.0	5.5	6.0	9.5	6.0	60.00	59.50	119.50
China	Diver 2	22	2.0	6.5	5.0	0.5	7.0	0.5	4.0	3.0	35.15	24.00	59.15
France	Diver 3	24	4.8	1.5	2.0	5.0	4.0	9.5	7.5	7.5	70.50	79.20	149.70
China	Diver 4	17	3.2	3.5	10.0	1.0	4.0	9.5	1.5	5.5	57.60	41.60	99.20
U S A	Diver 5	24	2.6	4.0	0.0	6.0	6.0	4.5	8.5	3.0	30.00	37.70	67.70
Spain	Diver 6	22	3.7	3.0	9.5	7.0	5.5	1.0	5.0	0.0	34.00	49.95	83.95
Brazil	Diver 7	30	4.7	0.0	2.5	0.5	4.5	7.5	10.0	5.0	99.45	56.40	155.85
Malaysia	Diver 8	24	3.9	2.5	5.5	6.0	0.5	0.5	1.5	9.0	45.15	37.05	82.20
Thailand	Diver 9	26	4.7	4.5	3.5	2.5	1.5	2.5	2.0	0.0	31.20	32.90	64.10
Japan	Diver 10	29	2.8	10.0	8.5	4.5	6.0	7.0	0.0	7.5	78.75	57.40	136.15

**** (you see the carried forward scores were the final scores of Round 1)**

Rank after round 2

Rank	Country	Name	Score
1.	Brazil	Diver 7	155.85
2.	France	Diver 3	149.70
3.	Japan	Diver 10	136.15
4.	Singapore	Diver 1	119.50
5.	China	Diver 4	99.20
6.	Spain	Diver 6	83.95
7.	Malaysia	Diver 8	82.20
8.	U S A	Diver 5	67.70
9.	Thailand	Diver 9	64.10
10.	China	Diver 2	59.15

Let me show you one more round i.e. Round 3:

```
Round  3

Staring Position

No     Country   Name      DF
 1.    Singapore Diver 1   4.4
 2.    China     Diver 2   4.2
 3.    France    Diver 3   2.8
 4.    China     Diver 4   2.9
 5.    U S A     Diver 5   4.3
 6.    Spain     Diver 6   3.2
 7.    Brazil    Diver 7   4.4
 8.    Malaysia  Diver 8   2.3
 9.    Thailand  Diver 9   2.3
10.    Japan     Diver 10  3.5

Country   Name      Age  DF   J1   J2   J3   J4   J5   J6   J7   c/f      Total     Final
Singapore Diver 1    18  4.4  2.5  0.5  8.5  2.5  3.0  9.5  8.0  119.50   59.40     178.90
China     Diver 2    22  4.2  0.0  1.0  3.5  5.5  2.0  2.5  7.5  59.15    33.60     92.75
France    Diver 3    24  2.8  8.5  8.0  10.0 9.0  4.5  9.0  8.0  149.70   71.40     221.10
China     Diver 4    17  2.9  7.5  8.0  9.5  6.0  0.0  9.0  6.5  99.20    63.80     163.00
U S A     Diver 5    24  4.3  7.0  9.5  5.5  1.5  1.5  8.5  9.5  67.70    90.30     158.00
Spain     Diver 6    22  3.2  4.5  9.0  9.0  6.5  3.5  7.0  3.0  83.95    57.60     141.55
Brazil    Diver 7    30  4.4  5.5  2.5  4.0  9.5  9.0  2.5  10.0 155.85   81.40     237.25
Malaysia  Diver 8    24  2.3  10.0 0.5  7.0  10.0 6.0  6.0  10.0 82.20    52.90     135.10
Thailand  Diver 9    26  2.3  4.5  4.5  0.5  6.5  6.0  3.5  9.5  64.10    34.50     98.60
Japan     Diver 10   29  3.5  1.0  0.5  4.0  1.5  5.5  10.0 6.0  136.15   38.50     174.65
```

```
Rank after round 3

Rank  Country   Name      Score
 1.   Brazil    Diver 7   237.25
 2.   France    Diver 3   221.10
 3.   Singapore Diver 1   178.90
 4.   Japan     Diver 10  174.65
 5.   China     Diver 4   163.00
 6.   U S A     Diver 5   158.00
 7.   Spain     Diver 6   141.55
 8.   Malaysia  Diver 8   135.10
 9.   Thailand  Diver 9   98.60
10.   China     Diver 2   92.75
```

Note that you need to display up to 5 rounds.

A few important tasks you may want explore them in your design:

- To construct a list of DiverInfo objects
- Some methods to generate for example the degree of difficulty (between 2 to 5), the age (between 15 to 30)
- A method to display the game info
- A method to display the result (display result method together with print info method defined in the Diving class)
- A method to display the ranking

- Etc.

Convenient to your design, feel free to amend the suggested methods.

Python interpreter tends to close the displayed windows "very fast"!!! Let me have an opportunity to see your results; please add in the following input instruction to be the last statement of your program:

IMPORTANT

The name of your program must be **YourName_A3.py** and make sure that this file can can be executed. Upload **ONLY** this file to Moodle**. ALL ZIP FILE SUBMISSION WILL BE REJECTED.**

No re-submission will be allowed after grading.

In the above file, remember to put down your name and the following declaration (some similar contents):

```
# Tell me if it is your own work, and whether you have passed your
# program to your friends etc etc etc
# and willing to accept whatever penalty given to you.
```

- **Wrong file name -0.2 mark**
- **No declaration, no name etc -0.2 mark**
- **No demo -0.5**