

Exercise of Programming Language, Homework E7

Write 6 Python programs to solve the following questions. Please name your program files as *Q1.py*, *Q2.py*, and so on, *i.e.*, according to the serial number of questions. Compress your programs into a ZIP file and submit it to e3.

1. Write a Python user-defined function named **my_round()**, which takes two arguments and acts similarly with the Python inborn function `round()` but automatically adds "0"s to the end of the result when needed. **The output of this function shall be a string.** For instance,

```
assert my_round(10, 3) == "10.000"
assert my_round(0.2345, 3) == "0.234"
assert my_round(12.32, 5) == "12.32000"
```

2. Given three DNA sequences,

```
dna_1 = "ACGTATTATGTTGCTATCAGATCGATTATGCGTTATCATCATATATACGT"
dna_2 = "TATTAGTGTCGGCCGCACATACTAT"
dna_3 = "CCGGGGTAGGATGATTGGACCCATCGGGTATGCCATACGT"
```

please write a function that takes one DNA sequence per turn, and then returns its CG content. Use the following assertions to test your function:

```
assert my_cg_content(dna_1) == 0.32
assert my_cg_content(dna_2) == 0.44
assert my_cg_content(dna_3) == 0.575
```

3. Given a list,

```
numbers = [50.9, 50.3, 48.7, 89.2, 60.0, 74.0, 54.2, 101.6, 84.9, 82.1, 79.4,
93.8]
```

please write a function that takes a list to calculate and return its medium. Use the following assertions to test your function:

```
assert my_medium(numbers) == 76.7
```

4. Write a function that takes one argument n to print out a triangle, the boundary and inside of which are composed of "*" and "+", respectively. For example, if $n = 5$, your triangle should look like this:

```
  *
 *+*
*+++*
*++++*
*****
```

5. By recent estimation, half people living in Taiwan are overweight and about one-third of these people are clinically considered to be obese. This causes significant increases in illnesses such as diabetes and heart diseases. To determine whether a person is overweight or obese, an inaccurate but convenient way is to use a measure known as the body mass index (BMI), which is defined by the following equation,

$$\text{BMI} = \frac{\text{weightInKilograms}}{\text{heightInMeters} \times \text{heightInMeters}}$$

Write a function that takes two arguments: weight in kilograms and height in meters, and then calculates and returns the body mass index (BMI).

6. Write a function that takes one argument n , and then calculates and returns the n^{th} number in Fibonacci sequence, the rule of which is shown below,

$$\begin{aligned} F_0 &= 0, F_1 = 1 \\ F_n &= F_{n-1} + F_{n-2} \quad (n \geq 2) \end{aligned}$$

Use the following assertions to test your function:

```
assert my_fibonacci(5) == 5
assert my_fibonacci(10) == 55
```