第十三周

本周目标

1. 掌握文件读写
2. 掌握递归
3. 掌握 list comprehension

1. Write a program that computes the net amount of a bank account based a transaction log from console input.
   The transaction log format is shown as following:
   ```
   D 100
   W 200
   ```
   `D` means deposit while `W` means withdrawal.

   Suppose the following input is supplied to the program:
   ```
   D 300
   D 300
   W 200
   D 100
   ```
   Then, the output should be:
   ```
   500
   ```

2. Based on Question 1, use the file `open() / close()`, `readline()` methods to read the read from log.txt and store the result in net_amout.txt
   Hint: It is interesting to test the subtle difference between `input()` and `readline()`. Both of them will read a line from the console or text. However, `input()` will not accept the last "`\n`" in the input and `readline()` will read the whole line including "`\n`".

3. A robot moves in a plane starting from the original point (0,0). The robot can move toward `UP`, `DOWN`, `LEFT` and `RIGHT` with given steps.
   The trace of robot movement is shown as the following:
   ```
   UP 5
   DOWN 3
   LEFT 3
   RIGHT 2
   ```
   The numbers after the direction are steps. Please write a program to compute the distance from current position after a sequence of movement and original point. If the distance is a float, then just print the nearest integer.

Suppose the following input is supplied to the program:

```
UP 5
DOWN 3
LEFT 3
RIGHT 2
```

Then, the output of the program should be:

```
2
```

4. Rewrite Question 3 to read from a file and write into another file.

5. The Fibonacci Sequence is computed based on the following formula:

$$f(n) = \begin{cases} 0, \text{if } n = 0 \\ 1, \text{if } n = 1 \\ f(n-1) + f(n-2), \text{if } n > 1 \end{cases}$$

Please write a program to compute the value of `f(n)` with a given `n` input by console.

If the following n is given as input to the program:

```
7
```

Then, the output of the program should be:

```
13
```

Hints: We can define recursive function in Python.

6. When n is large, e.g., 100, the function in Question 5 is very slow. Try to rewrite it in the loop form.

7. Use a list comprehension to square each odd number in a list. The list is input by a sequence of comma-separated numbers.

Suppose the following input is supplied to the program:

```
1, 2, 3, 4, 5, 6, 7, 8, 9
```

Then, the output should be:

```
1, 3, 5, 7, 9
```

8. Write a program which accepts a sequence of comma separated 4 digit binary numbers as its input and then check whether they are divisible by 5 or not. The numbers that are divisible by 5 are to be printed in a comma separated sequence.

Suppose the following input is supplied to the program:

```
0100, 0011, 1010, 1001
```

Then the output should be:

```
1010
```

9. Write a program that calculates and prints the value according to the given formula:

$Q = \sqrt{2 * C * D/H}$

Where `C` is `50`, `H` is `30`, `D` is the variable whose values should be input to your program in a comma-separated sequence.

Suppose the following input is supplied to the program:
`100, 150, 180`
The output of the program should be:
`18, 22, 24`

Note: If the output received is in decimal form, it should be rounded off to its nearest value (for example, if the output received is `26.0`, it should be printed as `26`)