Exercise #10

The following problems are selected from https://leetcode.com/

You can find the solutions from leetcode or google.

☐ **Problem 1. Integer to Roman**

Roman numerals are represented by seven different symbols: I, V, X, L, C, D and M.

https://en.wikipedia.org/wiki/Roman_numerals

| Symbol | I | V | X | L | C | D | M |
|--------|---|---|----|----|-----|-----|-------|
| Value | 1 | 5 | 10 | 50 | 100 | 500 | 1,000 |

For example, two is written as II in Roman numeral, just two one's added together. Twelve is written as, XII, which is simply X + II. The number twenty seven is written as XXVII, which is XX + V + II.

Roman numerals are usually written largest to smallest from left to right. However, the numeral for four is not IIII. Instead, the number four is written as IV. Because the one is before the five we subtract it making four. The same principle applies to the number nine, which is written as IX. There are six instances where subtraction is used:

- I can be placed before V (5) and X (10) to make 4 and 9.
- X can be placed before L (50) and C (100) to make 40 and 90.
- C can be placed before D (500) and M (1000) to make 400 and 900.

For example:

- 39 = "Thirty nine" (XXX+IX) = **XXXIX**.
- 246 = "Two hundred and forty six" (CC+XL+VI) = **CCXLVI**.
- 207 = "Two hundred and seven" (CC+VII) = **CCVII**
- 1066 = "A thousand and sixty six" (M+LX+VI) = **MLXVI**.
- 1776 (M+DCC+LXX+VI) = **MDCCLXXVI**
- 1954 (M+CM+L+IV) = **MCMLIV**
- 1990 (M+CM+XC) = **MCMXC**
- 2014 (MM+X+IV) = **MMXIV**
- 2018 = **MMXVIII**.

**Given an integer, convert it to a roman numeral. Input is guaranteed to be within the range from 1 to 3999.**

**Example 1:**

**Input:** 3
**Output:** "III"

**Example 2:**

**Input:** 4
**Output:** "IV"

**Example 3:**

**Input:** 9
**Output:** "IX"

**Example 4:**

**Input:** 58
**Output:** "LVIII"
**Explanation:** L = 50, V = 5, III = 3.

**Example 5:**

**Input:** 1994
**Output:** "MCMXCIV"
**Explanation:** M = 1000, CM = 900, XC = 90 and IV = 4.


☐ **Problem 2. Roman to Integer**

Roman numerals are represented by seven different symbols: I, V, X, L, C, D and M.

https://en.wikipedia.org/wiki/Roman_numerals

| Symbol | I | V | X | L | C | D | M |
|--------|---|---|----|----|-----|-----|-------|
| **Value** | 1 | 5 | 10 | 50 | 100 | 500 | 1,000 |

For example, two is written as II in Roman numeral, just two one's added together. Twelve is written as, XII, which is simply X + II. The number twenty seven is written as XXVII, which is XX + V + II.

Roman numerals are usually written largest to smallest from left to right. However, the numeral for four is not IIII. Instead, the number four is written as IV. Because the one is before the five we subtract it making four. The same principle applies to the number nine, which is written as IX. There are six instances where subtraction is used:

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- 1954 (M+CM+L+IV) = **MCMLIV**
- 1990 (M+CM+XC) = **MCMXC**
- 2014 (MM+X+IV) = **MMXIV**
- 2018 = **MMXVIII**.

**Given a roman numeral, convert it to an integer. Input is guaranteed to be within the range from 1 to 3999.**

**Example 1:**

**Input:** "III"
**Output:** 3

**Example 2:**

**Input:** "IV"
**Output:** 4

**Example 3:**

**Input:** "IX"
**Output:** 9

**Example 4:**

**Input:** "LVIII"
**Output:** 58
**Explanation:** L = 50, V= 5, III = 3.

**Example 5:**

**Input:** "MCMXCIV"

**Output:** 1994
**Explanation:** M = 1000, CM = 900, XC = 90 and IV = 4.

☐ **Problem 3. Process Dengue_Daily_EN.csv** (完整題目以英文為主，中文只是概念參考)

Read Dengue_Daily_EN.csv.
Count the number of cases in 'Kaohsiung City' each year from 2000 to 2019 (according to Date_Onset column). Show the number of cases per year to screen and also output to a csv file named out.csv. 統計 **2000-2019** 當中，Kaohsiung City 每年出現的病例次數(以Date_Onset欄位日期為準)，同時輸出到螢幕及檔案。(底下例子的數字只是參考，不是正確答案)

● Format of screen output (輸出到螢幕格式如下):

| Year | num_cases |
|------|-----------|
| 2000 | 20 |
| 2001 | 60 |
| 2002 | 40 |
| ... | |

● Format of CSV output 'out.csv' (輸出到 CSV 檔案格式如下，檔名為 out.csv):

Year, num_cases
2000, 20
2001, 60
2002, 40
...

☐ **Problem 4.** 10co2008CO_err.txt.

Read 10co2008CO_err.txt. Calculate the maximum, minimum, and average 'Close' values for each month. Show the maximum, minimum, and average values per month to screen and also output to a csv file named out.csv. If the record is incomplete or the Close value cannot be converted to floating value, just skip the record. 計算每月Close 欄位的最大、最小值及平均，同時輸出到螢幕及檔案，若該筆資料不完整，或無法轉float 就跳掉該筆 。(底下例子的數字只是參考，不是正確答案)

● 輸出到螢幕格式如下:

| Month | max | min | average |
|-------|-----|-----|---------|
| 1 | 40.3 | 20.9 | 30.3 |
| 2 | 38.4 | 32.1 | 36.4 |
| 3 | 38.9 | 34.1 | 36.9 |
| ... | | | |

● 輸出到 CSV 檔案格式如下，檔名為 out.csv:

Month, max, min, average

1,	40.3 ,	20.9,	30.3
2,	38.4 ,	32.1,	36.4
3,	38.9,	34.1,	36.9
…