Assignment 1

COMP9021, Trimester 2, 2019

1. General matters

1.1. **Aim.** The purpose of the assignment is to:

- develop your problem solving skills;
- design and implement the solution to a program in the form of a medium sized Python program;
- practice the use of arithmetic computations, tests, repetitions, lists, and strings.

设计与实现

使用算术计算、测试、重复、列表和字符串。

1.2. **Submission.** Your program will be stored in a file named `roman_arabic.py`. After you have developed and tested your program, upload it using Ed (unless you worked directly in Ed). Assignments can be submitted more than once; the last version is marked. Your assignment is due by July 14, 11:59pm.

1.3. **Assessment.** The assignment is worth 10 marks. It is going to be tested against a number of inputs. For each test, the automarking script will let your program run for 30 seconds.

自动标记脚本

Late assignments will be penalised: the mark for a late submission will be the minimum of the awarded mark and 10 minus the number of full and partial days that have elapsed from the due date.

迟交作业将会被扣分:迟交作业的分数将会以所获分数的最低值为限，再减去截止日期后的完整及部分天数。

The outputs of your programs should be **exactly** as indicated.

1.4. **Reminder on plagiarism policy.** You are permitted, indeed encouraged, to discuss ways to solve the assignment with other people. Such discussions must be in terms of algorithms, not code. But you must implement the solution on your own. Submissions are routinely scanned for similarities that occur when students copy and modify other people's work, or work very closely together on a single implementation. Severe penalties apply.

2. Description

设计与实现

提示；提示性语言

You will design and implement a program that prompts the user for an input with `How can I help you?` . User input should be one of three possible kinds:

转变

- `Please convert ***`
- `Please convert *** using ***`
- `Please convert *** minimally`

最低限度地

发生；出现

非空间符号的任意非空序列

If user input is not of this form, with any occurrence of `***` an arbitrary nonempty sequence of nonspace symbols, then the program should print out

```
I don't get what you want, sorry mate!
```

and stop.

***应该是一个严格的正整数(其表示法不应该以0开头)，可以转换为罗马数字(因此最多等于3999)，或者是一个有效的罗马数字;否则，程序应该打印出来

2.1. **First kind of input.** In case the user inputs `Please convert ***`, then `***` should be either a strictly positive integer (whose representation should not start with 0) that can be converted to a Roman number (hence be at most equal to 3999), or a valid Roman number; otherwise, the program should print out

```
Hey, ask me something that's not impossible to do!
```

and stop. If the input is as expected, then the program should perform the conversion, from Arabic to Roman or from Roman to Arabic, and print out the result in the form

如果输入符合预期，则程序应执行从阿拉伯语到罗马语的转换
或从罗马语到阿拉伯语，并打印出形式的结果

`Sure! It is ***`

第二种输入。如果用户输入使用***转换***，那么第一个***应该是一个严格的正整数(其表示形式不应该以0开头)或一个(小写或大写)字母序列，第二个***应该是一个不同的(小写或大写)字母序列。
此外，

2.2. **Second kind of input.** In case the user inputs `Please convert *** using ***`, then the first *** should be a strictly positive integer (whose representation should not start with 0) or a sequence of (lowercase or uppercase) letters and the second *** should be a sequence of *distinct* (lowercase or uppercase) letters. Moreover,第二个***表示一系列所谓的泛化罗马符号，即与MDCLXVI序列对应的经典罗马符号，其最右边的元素表示1、第二个最右边的元素、5、第三个最右边的元素、10等；

- the second *** is intended to represent a sequence of so-called *generalised Roman symbols*, the classical Roman symbols corresponding to the sequence `MDCLXVI`, whose rightmost element is meant to represent 1, the second rightmost element, 5, the third rightmost element, 10, etc.;
- if it is not an integer, the first *** is intended to represent a so-called *generalised Roman number*, that is, a sequence of generalised Roman symbols that can be decoded using the provided sequence of generalised Roman symbols similarly to the way Roman numbers are represented.

如果不是整数，则第一个***表示一个所谓的泛化罗马数字，即泛化罗马符号序列，可以使用所提供的泛化罗马符号序列(类似于罗马数字的表示方式)解码。

如果不是这样，如果无法将第一个***从阿拉伯语转换为通用罗马语或从通用罗马语转换为阿拉伯语，则程序应打印出来
If that is not the case, of if it is not possible to convert the first *** from Arabic to generalised Roman or from generalised Roman to Arabic, then the program should print out

```
Hey, ask me something that's not impossible to do!
```

and stop. If the input is as expected and the conversion can be performed, then the program should indeed perform the conversion, from Arabic to generalised Roman or from generalised Roman to Arabic, and print out the result in the form 如果输入符合预期，并且可以执行转换，那么程序确实应该执行转换
执行从阿拉伯语到一般罗马语或从一般罗马语到阿拉伯语的转换，并在表单中打印结果

```
Sure! It is ***
```

转化，转变　　最低限度地
2.3. **Third kind of input.** In case the user inputs `Please convert *** minimally`, then *** should be a sequence of (lowercase or uppercase) letters. The program will try and view *** as a generalised Roman number with respect to some sequence of generalised Roman symbols. If that is not possible, then the program should print out 该程序将尝试将***看作一个通用的罗马数字与一些通用罗马符号序列。如果这是不可能的，那么程序应该打印出来

然后***应该是（小写或大写）字母的序列

```
Hey, ask me something that's not impossible to do!
```

and stop. Otherwise, the program should find the *smallest* integer that could be converted from ***, viewed as some generalised Roman number, to Arabic, and output a message of the form
否则，程序应该找到可以从***转换成阿拉伯数字的最小整数，并输出表单的消息

```
Sure! It is *** using ***
```

2.4. **Sample outputs.** Here are a few tests together with the expected outputs. The outputs of your program should be exactly as shown.

```
$ python3 roman_arabic.py
How can I help you? Please do my assignment...
I don't get what you want, sorry mate!
$ python3 roman_arabic.py
How can I help you? please convert 35
I don't get what you want, sorry mate!
$ python3 roman_arabic.py
How can I help you? Please convert 035
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert 4000
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert IIII
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert IXI
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
```

```
How can I help you? Please convert 35
Sure! It is XXXV
$ python3 roman_arabic.py
How can I help you? Please convert 1982
Sure! It is MCMLXXXII
$ python3 roman_arabic.py
How can I help you? Please convert 3007
Sure! It is MMMVII
$ python3 roman_arabic.py
How can I help you? Please convert MCMLXXXII
Sure! It is 1982
$ python3 roman_arabic.py
How can I help you? Please convert MMMVII
Sure! It is 3007
$ python3 roman_arabic.py
How can I help you? Please convert 123 by using ABC
I don't get what you want, sorry mate!
$ python3 roman_arabic.py
How can I help you? Please convert 123 ussing ABC
I don't get what you want, sorry mate!
$ python3 roman_arabic.py
How can I help you? Please convert XXXVI using VI
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert XXXVI using IVX
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert XXXVI using XWVI
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert I using II
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert _ using _
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert XXXVI using XVI
Sure! It is 36
$ python3 roman_arabic.py
How can I help you? Please convert XXXVI using XABVI
Sure! It is 306
$ python3 roman_arabic.py
How can I help you? Please convert EeDEBBBaA using fFeEdDcCbBaA
Sure! It is 49036
$ python3 roman_arabic.py
How can I help you? Please convert 49036 using fFeEdDcCbBaA
Sure! It is EeDEBBBaA
$ python3 roman_arabic.py
How can I help you? Please convert 899999999999 using AaBbCcDdEeFfGgHhIiJjKkLl
Sure! It is Aaaabacbdcedfegfhgihjikjlk
$ python3 roman_arabic.py
How can I help you? Please convert ABCDEFGHIJKLMNOPQRST using AbBcCdDeEfFgGhHiIjJkKlLmMnNoOpPqQrRsStT
Sure! It is 11111111111111111111
$ python3 roman_arabic.py
```

```
How can I help you? Please convert 1900604 using LAQMPVXYZIRSGN
Sure! It is AMAZING
$ python3 roman_arabic.py
How can I help you? Please convert ABCD minimally using ABCDE
I don't get what you want, sorry mate!
$ python3 roman_arabic.py
How can I help you? Please convert ABCD minimaly
I don't get what you want, sorry mate!
$ python3 roman_arabic.py
How can I help you? Please convert 0I minimally
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert ABAA minimally
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert ABCDEFA minimally
Hey, ask me something that's not impossible to do!
$ python3 roman_arabic.py
How can I help you? Please convert MDCCLXXXVII minimally
Sure! It is 1787 using MDCLXVI
$ python3 roman_arabic.py
How can I help you? Please convert MDCCLXXXIX minimally
Sure! It is 1789 using MDCLX_I
$ python3 roman_arabic.py
How can I help you? Please convert MMMVII minimally
Sure! It is 37 using MVI
$ python3 roman_arabic.py
How can I help you? Please convert VI minimally
Sure! It is 4 using IV
$ python3 roman_arabic.py
How can I help you? Please convert ABCADDEFGF minimally
Sure! It is 49269 using BA_C_DEF_G
$ python3 roman_arabic.py
How can I help you? Please convert ABCCDED minimally
Sure! It is 1719 using ABC_D_E
```