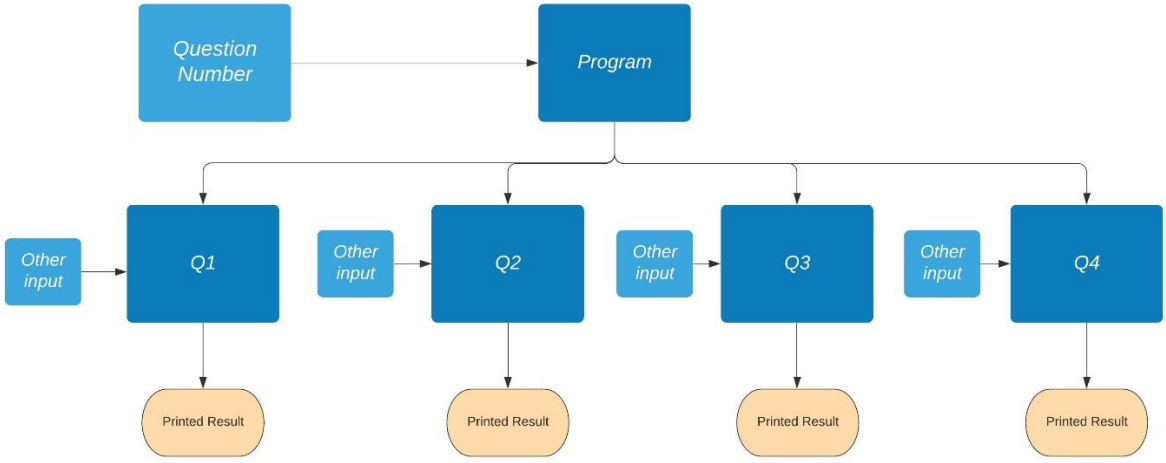
Homework Assignment 1

General information:

- Responsible teaching assistant: Ariel Cohen.
- To get quick answers regarding this assignment please ask in Piazza under label HW1.
- If necessary, office hours are on Thursday, 17:00-18:00 please send an email to coordinate prior.

Structure:

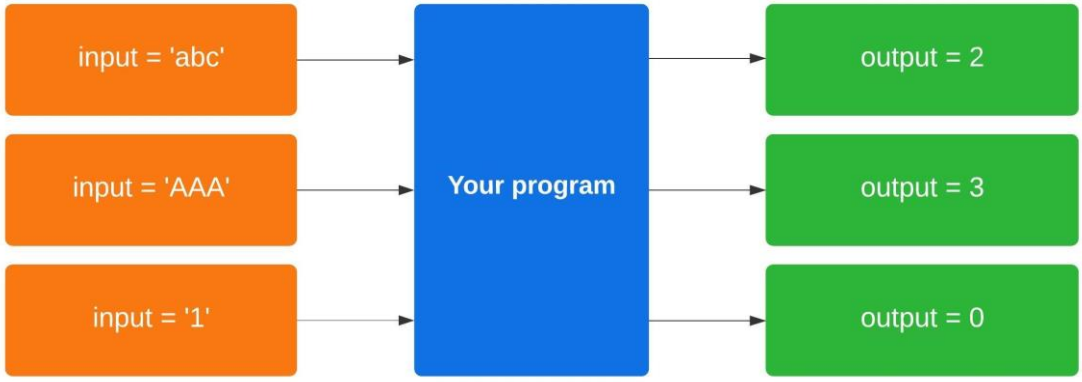
General menu: the program receives as input the question number (the input will be entered by the test system) and then other inputs will be given depending on the question, as follows:



Question 1 - vowels:

The program receives a string as input and prints the number of letters (a-z or A-Z) that aren't lower case vowels (a, e, i, o, u, y). Note that the letter 'y' is considered a vowel for this purpose. Use input() in order to get a string from the test system, and print out the final result.

Examples:

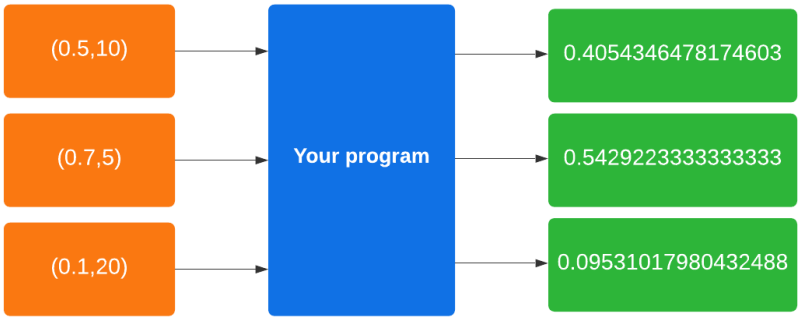


The output should be printed using the print() function, followed by exit().

Question 2 – Taylor approximation:

The program receives 2 inputs, x and n (**in that order**). The program then calculates the Taylor approximation (of order n) of the expression $\ln(1+x)$ around the point x. The program should perform input validity tests and print an 'error' message if the input is not in the correct format or there is a computational error. notice what kind of numbers x and n could be. You may assume that if the x given to you is in the correct format (float), it will satisfy: $x \in [-0.7, 0.7]$

Examples:

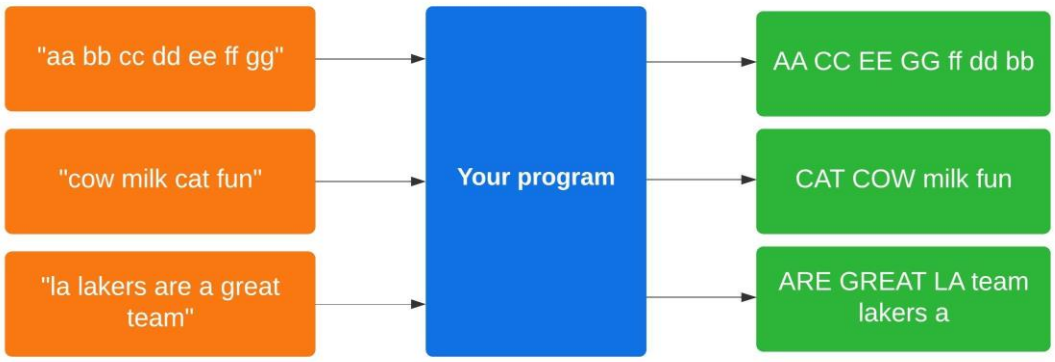


Note that results should be in high precision. Also as stated before, you need to use input() , and at the end of the question use exit(). If the input isn't valid you must print 'error'.

Question 3 – Playing with strings:

In this question you will receive a string words in English. (in this question, assume that the input is valid). You must take every even word (a word that is located in an even position in the string) and make it upper case, and every odd word and make it lower case. Then you must print the upper-case words in ascending lexicographical order, and then print the lower-case words in descending lexicographical order.

Example:



The output should be printed using the print() function, followed by exit().

Question 4 – Lychrel Numbers:

A Lychrel number is a natural number that cannot form a palindrome through the iterative process of repeatedly reversing its digits and adding the resulting numbers. This process is sometimes called the 196-algorithm. In base 10, no Lychrel numbers have been yet proved to exist, but many, including 196_{10}, are suspected on heuristic and statistical grounds (from Wikipedia).

About 80% of all numbers under 10,000 resolve into a palindrome in four or fewer steps; about 90% of those resolve in seven steps or fewer. Here are a few examples of non-Lychrel numbers:

- 56 becomes palindromic after one iteration: 56+65 = *121*
- 57 becomes palindromic after two iterations: 57+75 = 132, 132+231 = *363*

In this question, you are to receive a number, and the output should be as following:

1. If the number is a Lychrel candidate (meaning that the number of iterations needed is over 500) you shall print 'True'.
2. If the number isn't a Lychrel candidate, you shall print the number of iterations.

For example: for input 196, you will print 'True', and for input 33 you will print 0. For 56 you will print 1. Assume that the input is valid for this question.

Pay Attention:

- You must use input() where the program needs to receive an input. This will allow the input from the auto test methods.
- You are allowed (and it is highly recommended) to use functions.
- You are allowed to use built in methods that we did not study in class. (but not external libraries!)
- At the end of each question, you must print the result and then use the exit() method. If necessary, look up in google how to use this command.
- You may **not** use external libraries (no import statements allowed). This will be checked and grade will be reduced.
- Some tests will be visible for your convenience, others will not be and will be performed during the testing process.
- You must code this yourself. Similarity tests will be performed automatically and codes that are similar will be **automatically graded 0**.
- If the question number isn't valid you need to print 'error'
- You should submit a **single .py** file through the Moodle website with the name of **HW1.py**
- Good luck!!!