Assignment 4 - Functions and Strings

- The problems of this assignment must be solved in Python.
- The TAs are grading solutions to the problems according to the following criteria: https://grader.eecs.jacobs-university.de/courses/350111/2017_2is/Grading-Criteria-Python.pdf

Problem 4.1 *Length of a string I* (1 point)

Presence assignment, due by 18:30 h today

Write a program that reads a string from the keyboard and then computes and prints on the screen the length of the string without using any build-in functions like `len` or similar.
You can assume that the input will be valid.

Problem 4.2 *Distances* (1 point)

Presence assignment, due by 18:30 h today

Write a program that reads a float value for miles from the keyboard. The program then converts the miles into kilometers and prints the result on the screeen outside the `convert` function.
The converting should be done by a function `convert(miles)`. The conversion formula is:

```
1 mile = 1.609344 kilometers
```

You can assume that the input will be valid.

Problem 4.3 *Volumes I* (1 point)

Presence assignment, due by 18:30 h today

Write a program that converts the US units of volume (cups and gallons) to liters. First read a value for cups and then one for gallons as floats from the keyboard, and then convert the units of volume using a function `to_liter(gallon, cup)` that does the actual conversion and sums the two quantities. Print the result outside the `to_liter` function. The needed conversion formulas are:

```
1 gallon = 3.7854 liters
1 cup = 0.2366 liters
```

You can assume that the input will be valid.

Bonus Problem 4.4 *Length of a string II* (1 point)

Change your solution for **Problem 4.1** "*Length of a string I*" such that instead of computing the length of your string you call the built-in function `len`.

Problem 4.5 *Volumes II* (1 point)

Write a program where you can enter from the keyboard the radius `r` of a sphere as a floating point value. Then the volume of the sphere should be computed in a function that receives `r` as parameter. Use `pi` from the `math` module. Print the result on the screen outside of the function.
You can assume that the input will be valid.

Problem 4.6 *Guessing game* (1 point)

Change the program of the guessing game (Lecture 3&4, slide 41) in such a way that a `break` will be used if the right number is found. Also count the number of tries, and print it along with the message that the number is too small or too big.
You can assume that the input will be valid.

Problem 4.7 *Print string diagonally* (1 point)

Write a program where you can enter a string from the keyboard. Print the entered string on the screen in the following manner:

```
H
 e
  l
   l
    o
```

You can assume that the input will be valid.

Problem 4.8 *Determine vowels in string* (1 point)

Write a function `count_vowels(s)` that determines the number of vowels in a given string `s`. Then write a program where you can repeatedly enter a string from the keyboard and then the number of vowels is determined by calling the function and then printed on the screen. If the entered string is empty, the program should stop.
You can assume that the input will be valid.

Problem 4.9 *Slice a string* (1 point)

Write a program which enters a string `s` and two integer values `a` and `b` from the keyboard. Then the program should print on the screen the sliced substring of `s` between the positions `a` and `b` (including both positions). Make sure that `a` and `b` are valid values with respect to the string `s`. Therefore, repeatedly read the values for `a` and `b` until they will both be valid.

Problem 4.10 *String methods* (1 point)

Assign to the variable `data` the string `"Python is a great programming language"`. Use one string method from the tables given in the slides to perform each of the following tasks:

a) Print on the screen the list of words within the string;

b) Print on the screen the conversion of the string to uppercase;

c) Print on the screen the position of the word `"programming"`;

d) Print on the screen the result of replacing `'g'` in `data` with `'G'`.

Problem 4.11 *Replace substrings* (1 point)

Write a program which reads three strings from the keyboard: a longer string `text`, a substring to be replaced `s` and a replacing substring `r`. Your program should replace all occurrences of `s` within `text` by `r`. Print the string `text` on the screen before and after replacing.
Example: if `text="one example one"`, `s="one"`, `r="three"` then after replacing you should have `text="three example three"`.
You can assume that the input will be valid.

How to submit your solutions

Name the programs a4_p*x*.py.
Each program **must** include a comment on the top like the following:

```
# JTSK-350111
# a4_p1.py
# Firstname Lastname
# myemail@jacobs-university.de
```

You have to submit your solutions via *Grader* at
`https://grader.eecs.jacobs-university.de`.

If there are problems (but only then) you can submit the programs by sending mail to `k.lipskoch@jacobs-university.de` **with a subject line that starts with `JTSK-350111`**.

Please note, that after the deadline it will not be possible to submit solutions. It is useless to send solutions then by mail, because they will not be accepted.

Your code must run without any errors or warnings under python3.x.

This assignment is due by Wednesday, January 31st, 10:00 h