L03 Tasks

L03-T1: Integer testing with selection structure

L03-T2: Comparison of character strings with several conditions

L03-T3: Implementation of a simple calculator using menu

L03-T4: Application example of selection structure in grade calculation

L03-T5: Character string comparisons incl. palindrome testing

Submission:

- Submit L03-T5 to CodeGrade via Moodle before the deadline.

Note:

- Be especially careful with spaces so that your output follows the sample output. Note that also each input-string in the program is ending with '\n'. The reason for this is that it makes the output in CodeGrade more readable

- If you see some "Code Structure Tests" hidden in CodeGrade but they are not mentioned in the task description, you don't need to worry about them. They are just there to make sure the code is ok.

L03-T1: Chapter testing with choice structure

Make a Python program that implements the subtasks below using the selection structure.

1. Write a program that asks the user for a year (`int`) and checks if a given year (`int`) is a **leap year**. Leap years are divisible by 4. If a year is divisible by 100, but not divisible by 400, that year is skipped. Then return to the users using the following sentences: "`[given year]` is not a leap year." or "`[given year]` is a leap year."

Example run 1:

```
Enter a year:
2023
2023 is not a leap year.
```

Example run 2:

```
Enter a year:
2000
2000 is a leap year.
```

Example run 3:

```
Enter a year:
2100
2100 is not a leap year.
```

L03-T2: Comparison of strings with multiple conditions

Write a program that works according to the following selection structure:

1. Ask if the user wants to stop running the program or not. If the user enters the letter 'Y', stop the program execution with the output "Bye!" (see Example run 1). If the user enters the letter ‘N’, then move to the next steps.
2. Ask the user for name and password.
3. If the name is "Pekka" and the password is "somerandomthing", print the text: "User recognized!" and end the program execution (see Example run 2)
4. Otherwise, print the length of the name and the information that the name or the password was not correct: "You entered an invalid login name or password." (see Example run 3)

Example run 1:

```
Do you want to stop the execution of the program (Y/N):
Y
Bye!
```

Example run 2:

```
Do you want to stop the execution of the program (Y/N):
N
Enter username:
Pekka
Enter password:
somerandomthing
User recognized!
```

Example run 3:

```
Do you want to stop the execution of the program (Y/N):
N
Enter username:
Pekka
Enter password:
supersecret
You entered an invalid login name or password.
```

Example run 4:

```
Do you want to stop the execution of the program (Y/N):

idk

Invalid input! Please try again.
```

L03-T3: Implementation of a simple calculator using a menu

Write a simple calculator that operates as described here:

1. The program starts by asking the user for two integers, which are stored in variables having the type of `int`.
2. Program asks whether the user wants to 1) add, 2) subtract, 3) multiply or 4) divide the numbers.
3. Next, the calculator will perform the desired operation and output the result.
4. If the user tries to divide by zero, then the calculator gives an error message "Zero cannot be used as a divisor." The result of the division operation must be rounded to two decimal places.

Note: If the user does not select 1-4, the program prints the text "The operation was not recognized."

Example run 1:

```
Enter the first number:
1911
Enter the second number:
22
The calculator can perform the following operations:
1) Add
2) Subtract
3) Multiply
4) Divide
The numbers you entered are 1911 and 22
Select the operation (1-4):
1
Selection 1: 1911 + 22 = 1933
```

Example run 2:

```
Enter the first number:
737
Enter the second number:
199
The calculator can perform the following operations:
1) Add
2) Subtract
3) Multiply
4) Divide
The numbers you entered are 737 and 199
Select the operation (1-4):
3
Selection 3: 737 * 199 = 146663
```

Example run 3:

```
Enter the first number:
36
Enter the second number:
0
The calculator can perform the following operations:
1) Add
2) Subtract
3) Multiply
4) Divide
The numbers you entered are 36 and 0
Select the operation (1-4):
4
Error: Zero cannot be used as a divisor.
```

Example run 4:

```
Enter the first number:
24
Enter the second number:
13
The calculator can perform the following operations:
1) Add
2) Subtract
3) Multiply
4) Divide
The numbers you entered are 24 and 13
Select the operation (1-4):
7
The operation was not recognized.
```

L03-T4: Grade calculation

Write a program that takes points (`float`) as input and then prints the corresponding grade based on the following grading scale:

- 90 – 100 5
- 80 – 89 4
- 70 – 79 3
- 60 – 69 2
- 50 – 59 1
- 0 – 49 0

Example run 1:

```
Enter your number of points:
56
Your grade is: 1
```

Example run 2:

```
Enter your number of points:
42.56
Your grade is: 0
```

Example run 3:

```
Enter your number of points:
90
Your grade is: 5
```

L03-T5: Character string comparisons incl. palindrome testing

(Submit this task to CodeGrade on Moodle)

In this exercise, we will perform simple operations on strings.
1. First the program asks for two words. Then, it compares these words according to the string comparison operation and prints the strings according to the order (see example runs). If the words are the same, print: “The words are the same.”. Remember that strings are compared in Python using the same operators as numbers.

2. After this, your program should test whether the given words contain the character 'z'. If the letter 'z' is found in either of the words (**or both!**), the program outputs: "The <word> contains 'z'." If the letter is not found, the program prints: "The letter 'z' was not found in either of the words."

3. Finally, your program should ask for a third string and determine whether it is a palindrome. Palindrome is a word that can be read in the same way from beginning to end as from end to beginning. If the given word is palindrome, print "The <word> is a palindrome." If not, print "The <word> is not a palindrome."

Example 1:

```
Enter word 1:
alpha
Enter word 2:
beta
'alpha' comes earlier in order than 'beta'.
The letter 'z' was not found in either of the words.
Enter a word to be tested:
rotator
'rotator' is a palindrome.
```

Example 2:

```
Enter word 1:
jazz
Enter word 2:
lazy
'jazz' comes earlier in order than 'lazy'.
Letter 'z' is found in word 'jazz'.
Letter 'z' is found in word 'lazy'.
Enter a word to be tested:
python
'python' is not a palindrome.
```

Example 3:

```
Enter word 1:
alpha
Enter word 2:
alpha
The words are the same.
The letter 'z' was not found in either of the words.
Enter a word to be tested:
rotator
'rotator' is a palindrome.
```

Example 4:

```
Enter word 1:
alphaz
Enter word 2:
alphaz
The words are the same.
Letter 'z' is found in word 'alphaz'.
Letter 'z' is found in word 'alphaz'.
Enter a word to be tested:
rotator
'rotator' is a palindrome.
```

Example 5:

```
Enter word 1:
alphaz
Enter word 2:
alpha
'alpha' comes earlier in order than 'alphaz'.
Letter 'z' is found in word 'alphaz'.
Enter a word to be tested:
rotator
'rotator' is a palindrome.
```