

Lab 03: Conditional structures and loops

Python Conditions and If statements

Python supports the usual logical conditions from mathematics:

- Equals: `a == b`
- Not Equals: `a != b`
- Less than: `a < b`
- Less than or equal to: `a <= b`
- Greater than: `a > b`
- Greater than or equal to: `a >= b`

These conditions can be used in several ways, most commonly in "if statements" and loops.

An "if statement" is written by using the `if` keyword.

Example

```
a = 33
b = 33
if b > a:
    print("b is greater than a")
elif a == b:
    print("a and b are equal")
```

Exercise 01:

Write a program that asks the user to enter an integer and displays "WIN" if the integer is between 50 and 70, otherwise displays "LOSE".

Python For Loops

A `for` loop is used for iterating over a sequence (that is either a list, a tuple, a dictionary, a set, or a string).

This is less like the `for` keyword in other programming languages, and works more like an iterator method as found in other object-orientated programming languages.

With the `for` loop we can execute a set of statements, once for each item in a list, tuple, set etc.

Example

Print all numbers from 0 to 5, and print a message when the loop has ended:

```
for x in range(6):  
    print(x)  
else:  
    print("Finally finished!")
```

The while Loop

With the `while` loop we can execute a set of statements as long as a condition is true.

Example

Print i as long as i is less than 6:

```
i = 1  
while i < 6:  
    print(i)  
    i += 1
```

Example

Print a message once the condition is false:

```
i = 1  
while i < 6:  
    print(i)  
    i += 1  
else:  
    print("i is no longer less than 6")
```

Exercise 02:

Write a program that displays all integers from 8 to 23 using a for loop and then a while loop.

Exercise 03:

Write a program that asks the user to enter 10 integers and displays their sum.

Exercise 04:

Write a program that asks the user to enter 10 integers and displays the smallest of these integers.

Exercise 05:

Write a program that asks the user to enter an integer N and calculates u(N) defined by:

$$u(0)=3, u(n+1)=3*u(n)+4.$$

Exercise 06:

Write a program that asks the user to enter strictly positive integers and displays their average. When a negative value is entered, the program displays ERROR and asks the user to re-enter a value. When 0 is entered, it means that the last integer has been entered. The average is then displayed. If the number of integers entered is 0, the program displays NO AVERAGE.

Exercise 07:

Write a program that asks the user to enter an integer N and displays N!.

Exercise 08:

Write a program that asks the user to enter an integer and indicates whether this integer is prime or not.