Practice work 4- Working with Loops in Python

Objective: Familiarize yourself with looping constructs There are two types of looping expressions in Python:

- while loop
- for loop

1. while loop in python

The while statement in Python repeats the specified block of code as long as the logical expression specified in the loop remains true.

while loop syntax:

while boolean expression:

team 1
team 2
...
command n

The while keyword is followed by a conditional expression, and as long as that expression evaluates to True, the block of statements that follows will be executed.

All statements that belong to the while loop are located on subsequent lines and must be indented from the beginning of the line (4 spaces).

```
#! Программа по вычислению факториала
number = int(input("Введите число: "))
i = 1
factorial = 1
while i <= number:
    factorial *= i
    i += 1
print("Факториал числа", number, "равен", factorial)
```

Python Program Example

```
Python 3.4.1 (v3.4.1:c0e311e010fc, May 18 2014, 10:38:22) [MSC v.1600 32 bit (In
tel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> ================================ RESTART ================================
>>>
Введите число: 5
Факториал числа 5 равен 120
>>>
```

The result of executing a program using the while loop statement

2. for loop in python:

The for loop in Python has the ability to iterate over the elements of any

a complex data type (such as a string or a list).

For loop syntax:

forint range():

team 1

team 2

...

command n

The variable int is assigned the value of the first element of the range() function, after which the commands are executed. Then an int variable

the next value is assigned, and so on, until all the elements of the range() function have been iterated.

The range() function is a generic Python function for creating lists containing an arithmetic progression. It is most commonly used in for loops.

range(start, stop, step) - this is the standard call to the range() function in Python. By default, the start is zero, the step is one.

Example.

1. Find the sum of n elements of the following series of numbers: 1 -0.5 0.25 -0.125 ...

n. The number of elements (n) is entered from the keyboard. Display each term of the series and its sum.Solve the problem using the for loop.

Solution:

In this case, a series of numbers consists of elements, where each next one is twice less than the previous one in absolute value and has an opposite sign. So, to get the next element, you need to divide the previous one by -2.

Any variable must be assigned the value of the first element of the series (in this case, it is 1). Next, in the loop, add its value to the variable in which the sum is accumulated, and then assign it the value of the next element in the series, dividing the current value by -2. The loop must be executed n times.

```
n=int(input('Введите количество элементов последоваетльности: '))
x=1
s=0
print(x)
for i in range(n):
    s+=x
    x/=-2
    print(x)
print('Сумма ряда:',s)
```

An example program with a for loop

```
Введите количество элементов последоваетльности: 5
1
-0.5
0.25
-0.125
0.0625
-0.03125
Сумма ряда: 0.6875
```

The result of the program execution

2. You are given an integer not less than 2. Print its smallest natural divisor different from 1.

Solution:

First, let's enter an integer with the command int(input(message text)). Then we set the variable i to 2. The variable i acts as a counter. If you set it to 1, then the task condition will not

executed, and the result will always be 1.

The while loop uses the n%i command as a boolean expression compared to zero. Thus, if the remainder of dividing the entered number by the current value i is not equal to zero, then the counter is incremented by 1, and if it is equal to zero, the loop ends and the print() command displays a message and the value of i.

```
n = int(input('Введите целое число не меньшее 2\n'))
i = 2
while n%i != 0:
    i+=1
print('наименьший натуральный делитель:',i)
```

An example program with a while loop

```
Введите целое число не меньшее 2
49
наименьший натуральный делитель: 7
```

The result of the program execution

Exercise.

1. A real number is given - the price of 1 kg of sweets. Print the cost of 1, 2, ... 10 kg of sweets. Solve the problem using the for loop.

2. Given a non-empty sequence of integers ending in zero. Find: a) the sum of all numbers in the sequence; b) the number of all numbers in the sequence

Solve the problem using the while loop.