Chapter 7 - Loops in Python

Sometimes we want to repeat a set of statements in our program. For instance : Print 1 to 1000

Loops make it easy for a programmer to tell the computer, which set of instructions to repeat and how!

Types of loops in Python
Primarily there are two types of loops in Python
1. While loop
2. For loop

We will look into these one by one !

While loop
The syntax of a while loop looks like this :

While condition :
    # Body of the loop

⇒ The block keeps executing until the condition is true

In while loops, the condition is checked first. If it evaluates to true, the Body of the loop is executed, otherwise not!
If the loop is entered, the process of [Condition check & execution] is continued until the condition becomes false.

Quick Quiz : Write a program to print 1 to 50 using a while loop.

An Example

```
i = 0
while i < 5 :
       print ("Harry")
       i = i + 1
```

⟹ Prints "Harry" - 5 times!

Note : If the condition never becomes false, the loop keeps getting executed.

Quick Quiz : Write a program to print the content of a list using while loops.

For loop

A for loop is used to iterate through a sequence like list, tuple or string [Iterables]

The syntax of a for loop looks like this :

```
l = [1, 7, 8]
for item in l :
       print (item)
```

→ print 1, 7 and 8

Range function in Python

The range function in python is used to generate a sequence of numbers.
We can also specify the start, stop and step-size as follows :

```
range (start, stop, step-size)
```

↳ Step size is usually not used with range()

An Example demonstrating range() function

```
for i in range (0, 7):        → range(7) can also be used
    print (i)                 → prints 0 to 6
```

for loop with else
An optional else can be used with a for loop if the code is to be executed when the loop exhausts

Example:

```
l = [ 1, 7, 8 ]
for item in l :
    print (item)
else:
    print ("Done")          → This is printed when the
                              loop exhausts!
```

Output:
```
1
7
8
Done
```

The break statement
'break' is used to come out of the loop when encountered
It instructs the program to - 'Exit the loop now'

Example:

```
for i in range (0, 80):
    print (i)                → This will print 0, 1, 2
    if i == 3:                 and 3
        break
```

The continue statement

'Continue' is used to stop the current iteration of the loop and continue with the next one. It instructs the program to "Skip this iteration"

Example:

```
for i in range(4):
    print("printing")
    if i == 2:          => if i is 2, the iteration
        Continue              is skipped.
    print(i)
```

pass statement

pass is a null Statement in python
It instructs to "Do nothing"

Example:

```
l = [1, 7, 8]
for item in l:
    pass          → Without pass, the program
                    Will throw an error
```

Chapter 7 - Practice Set

1. Write a program to print multiplication table of a given number using for loop.

2. Write a program to greet all the person names stored in a list l1 and which starts with S

$$l_1 = [\text{"Harry"}, \text{"Soham"}, \text{"Sachin"}, \text{"Rahul"}]$$

3. Attempt problem 1 using while loop.

4. Write a program to find whether a given number is prime or not

5. Write a program to find the sum of first n natural numbers using while loop.

6. Write a program to calculate the factorial of a given number using for loop.

7. Write a program to print the following star pattern

```
    *
  * * *
* * * * *            for n = 3
```

8. Write a program to print the following star pattern:

```
*
* *
* * *        for n = 3
```

9 Write a program to print the following star pattern

```
*   *   *
*       *      for n = 3
*   *   *
```

10 Write a program to print multiplication table of n using for loop in reversed order.