**Loop Structure in Python**

1. while
2. for

**while**: used to execute instructions repeatedly till the condition is true.

while condition: while condition:

Statement1 Statement1

Statement2 Statement2

else:

Statement3

Statement4

else block is optional. If present, it is executed when condition fails.

If the while loop is terminated abruptly using a break, then the else block is not executed.

while 1: 🡨 infinite loop.

while True: 🡨 again an infinite loop.

**for:**

for var in list: for var in list:

statement1 statement1

statement2 statement2

else:

statement3

statement4

* During each iteration, **var** is assigned the next value from the list.
* In place of a list, a string, tuple, set or dictionary can also be used.
* **else** block is optional. If present, it will be executed if loop is not terminated by keyword **break**

**range():**

* **range()** function generates a sequence of integers.
* **Syntax:** range([start,] stop, [step]) 🡪 start (inclusive), stop (exclusive)
* If start value is not specified, it would always be considered as zero.
* range(10) 🡪 generates numbers from 0 to 9.
* range(10,20) 🡪 generates numbers from 10 to 19.
* range(10,20,2) 🡪 generates sequence 10 12 14…18.
* range(20,10,-3) 🡪 generates sequence 20 17 14…11.
* range() can’t generate a sequence on **float**s.

A **for** loop and **range**()

* for i in range(1,10,2):

print(i,i\*i,i\*i\*i)

A **for** loop and **string, list, tuple, set** or  **dictionary**

* We can use **for** loop to iterate through a string, list, tuple, set or dictionary. Look at various examples:

|  |  |
| --- | --- |
| **string:** | for char in 'PDPU':  print(char, end=' ') |
| **list:** | for animal in ['cat', 'dog', 'tiger', 'lion', 'leopard']:  print(animal, end=' ') |
| **tuple:** | for flower in ('Rose', 'Lily', 'jasmine'):  print(flower, end=' ') |
| **set:** | for num in { 10,20, 30, -20, -50}:  print(num, end=' ') |
| **dictionary** | for key in { 'a101':'SoT', 'a102':'SoET', 'a103':'SLS', 'a104': 'SoM' }:  print(key, end=' ') |

**enumerate(): to print the index value.**

ls = ['cat', 'dog', 'tiger', 'lion', 'leopard']

for i, ele in enumerate(ls):

print(i, ele)

**break** and **continue:**

* Both can be used with **for** and **while.**
* **break** terminates the loop without executing the **else** block.
* **Continue** skips the rest of the statements in the block and continues with the next iteration of the loop.

**else block of a loop:**

**else** block of a **while**  loop should be used in situations where you wish to execute some statements if the loop is terminated normally and not if it is terminated abruptly.

The **pass** statement:

* The **pass** statement doesn’t do anything.
* Used with **if** or within loop.

**Exercise:**

1. Print all alphabets in upper case and in lower case.
2. Print a multiplication table of a given number.
3. Count no. of alphabets and no. of digits in any given string.
4. Check whether a given number is prime, is perfect, is Armstrong, is palindrome, is automorphic.
5. Generate all Pythagorean Triplets with side length <= 30.
6. Print 24 hours of day with suitable suffixes like AM, PM, Noon and Midnight.
7. Print nCr and nPr.
8. Print factorial of a given number.
9. Print N natural nos. in reverse.
10. Generate N numbers of Fibonacci series.
11. Calculate sin(x); x is a radian value. The formula is as under:

(hint: degrees can be converted into radians by 3.14159 / 180.)