

Python Tutorial: Control Flow

1) State of water

Write a program that converts a temperature F from Fahrenheit to Celsius. Store the value in a variable C . Depending on the value of C , your program should print either “gas”, “liquid” or “solid”.

2) Bizz Buzz Woof

Generate a list of integers from 1 to 100. Iterate through this list, and if the value of the current number is divisible by 3, your program should print the word `bizz`; if the number is divisible by 5, it should print the word `buzz`; and if it is divisible by 7, the program should print „woof“. In all other cases, the number itself should be printed. If a number is divisible by several factors, all respective words should be printed. For example, for the numbers 7 to 15, the program should print

```
woof
8
bizz
buzz
11
bizz
13
woof
bizz buzz
```

3) Approximating the square root of a number

The square root of a number a can be approximated with the following iterative formula:

$$x_{n+1} = \frac{1}{2} \left(x_n + \frac{a}{x_n} \right).$$

In other words, $x_n \approx \sqrt{a}$ for large n . Implement this iterative algorithm for a given a , choosing any initial guess x_0 . Iterate until the criterion $|x_{n+1} - x_n|/|x_n| \leq 10^{-3}$ is met.

4) Bubble sort

Bubble sort is an algorithm to sort an arbitrary list of numbers. The idea is simple:

1. Iterate through the list from beginning to end.
2. At each step, compare two neighboring elements in the list. If they are not sorted, swap their positions. Otherwise do nothing.
3. Move on to the next pair of elements and repeat step 2.
4. Once you reach the end of the list, restart from step 1. Repeat this until all elements in the list are sorted.