Introduction to Python

Exercises

1. Write a function to calculate the first ten Fibonacci numbers:

$$F_0 = F_1 = 1, \qquad F_{n+1} = F_n + F_{n-1}$$

2. Write a program to read input from a text file, and print the lines in reverse order.

3. Write a program to write the cubes of the first ten integers to a file.

4. Write a function to test whether a given integer is prime.

5. Write a function to calculate $n! = n \times (n-1) \times \cdots \times 1$.

6. Write a function to calculate the roots of a quadratic polynomial $ax^2 + bx + c$ using the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

7. Write a function to read input from a text file and compile a frequency table of how often each letter occurs.

8. Write a function to calculate $\sqrt{a}$ by using the Newton–Raphson method to find the root of the polynomial $x^2 - a$:

$$x_{n+1} = x_n - \frac{x_n^2 - a}{2x_n} = \frac{x_n^2 + a}{2x_n}$$

9. Write a program to print out the current day and date in words (for example, "Monday 18 June 2018").

Further resources

- Eric Matthes, *Python Crash Course*, No Starch Press (2015)
- Mark Lutz, *Learning Python*, fifth edition, O'Reilly (2013)
- Mark Lutz, *Programming Python*, fourth edition, O'Reilly (2011)
- David Beazley, *Python Cookbook*, third edition, O'Reilly (2013)
- `https://ehmatthes.github.io/pcc/cheatsheets/README.html` – *Python Crash Course* resources and cheat sheets
- `https://www.python.org/` – Python Software Foundation
- `https://stackoverflow.com/` – General programming question and answer forum