Introduction to Programming in Python - Exercises

Kevin Rue-Albrecht
Oxford Biomedical Data Science Training Programme
2020-05-04 (updated: 2020-05-02)

Getting Started

- Launch Spyder 

- Locate the Python console (Ignore the file editor for now)
- Print the message “Hello world!” in the console.
- Print the type of the number 1.
- Print the type of the number 1.0.
- Open the help on the function 'range’ (see also: Ctrl i)
- Print the numbers from 1 to 9.
- Print the square of those numbers.

Working with modules: math

- Print the natural log of 10. In base 2. In base 10.
- What does the function `log1p` do?
- Print the square root 1234.
- Round 0.05 to the nearest integer.
- Round 0.05 to the nearest *greater* integer.
- Round 0.05 to the nearest *smaller* integer.
- Compute 2 at the power of 10.
- Print the value of π.
- Print the value of the mathematical constant e.

Working with modules: time, datetime

- Print the current date and time.
- Format the date and time to show only the date and time, without milliseconds.
- Extract the date only (remove the time).
- Compute the number of days since the 1st of January of this year.

Working with strings of characters

UNIVERSITY OF OXFORD

- Assign “Oxford Biomedical Data Science Training Programme” to a variable.
- Convert it to a fully lowercase string, save to a new variable
- Convert the new variable back to a string where each word is title-cased
- Split the lowercase string into individual words

Working with lists

- Using the list of lowercase words in “Oxford Biomedical Data Science Training Programme”
- Print each word, a tab space, and its length.
- Print the first half of the words in the list.
- Print the second half of the words in the list.
- Sort the words by increasing length.
- Sort the words by decreasing length.
- Join all the words back together using the '-' character.

Working with the file system: os, shutil

UNIVERSITY OF OXFORD

- Print the current working directory.
- List files in the current directory.
- Make a new folder called 'exercise'
- Change your working directory to that new folder.

Working with files

- Rsync the file ‘week2/ERR1755082.test.sam’ to you working directory
- Read the text file as a list of character strings.
- How many lines does the file contain?
- Print the first 10 lines
- For each of the first 10 lines, print:
- The number of characters
- The number of TAB-separated fields

Regular expressions

- Using the list of lines in ‘ERR1755082.test.sam’ from earlier
- Filter (keep) lines that contain chromosome lengths
- Reformat those lines as TAB-separated chromosome name and length

Reference: https://docs.python.org/3/library/re.html

F-string

- Make a list with the name of the trainees:
  - Andrea, Charlotte, Dharam, Edu, Piyush, Rose, Sumeet
- For each name, print it and its position in the rota
  - e.g. `Rota #<position>: <name>`
- Bonus point: randomise the list of names and print again.