Bielefeld University
Faculty of Technology

Genome Data Science
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Programming
Winter 24/25

Exercises

Number 01, Submission Deadline: October 23, 2024

1. Install Anaconda https://www.anaconda.com/download/success (you can click on "Skip registration") on your system. Then start the Anaconda Navigator and launch the application "Qt Console", which provides an interactive Python console. Familiarise yourself with the console and do your first trials in programming with Python. (2 P)
   Do the same with the Jupyter Notebook and JupyterLab applications: play around with code cells and text cells, start learning shortcuts and explore the interactivity of the documents.

2. Let's exponentiate and logarithmate! (8 P)
   In this exercise, you will be asked to raise a number to a power and then take the logarithm of the result. This is to make sure that your Python distribution and packages are correctly installed, and to let you start familiarising with arithmetic operations.
   You will use two new Python Built-in functions: `print()`[1] and `input()`[2]. The `print()` operation allows you to print results out, while the `input()` operation has the ability to read input from a user at the console and store values in a variable, so that the program can access that value as needed.
   Write a program that performs the following in order:

   (a) Asks the user to enter a number `x`
   (b) Asks the user to enter a number `y`
   (c) Prints out the number `x`, raised to the power of `y`
   (d) Prints out the log (base 2) of `x`

   Use JupyterLab to create your program, and save your code in a file named `01-GROUP<<letter>>_exercises.pdf`.
   An example of an interaction with your program is shown below. The words printed in cyan are ones the computer should print, based on your commands, while the words in black are an example of a user's input. The colours are simply here to help you distinguish the two components.

   Enter number x: 2
   Enter number y: 3
   x ** y = 8
   log(x) = 1

[1] https://docs.python.org/3/library/functions.html#print
[2] https://docs.python.org/3/library/functions.html#input

Hints:

- To take the logarithm of a variable, you can import the NumPy package. You can then *call*[3] `np.log2`[4] to calculate the logarithm.
- Remember that if you want to hold onto a value, you need to store it in a *variable* (i.e. give it a name to which you can refer when you want to use that value). Pay attention! If you don't *typecast* you variable into a number, you will get an error! Check out these examples: https://www.geeksforgeeks.org/python-input-function/.

Bonus:

1. Feeling like testing yourself? (2 P)
   Go over to my Google Drive following this link https://drive.google.com/file/d/1Hj911NVdz9rHMMzc50wb7coQmo79dBpy/view?usp=sharing and download this week's bonus exercises. It's a Jupyter Notebook (`.ipynb` extension) with 4 additional exercises to help you familiarise with Python. Each exercise is worth 0.5 points.
   After downloading the file, you can open it via JupyterLab and directly work on it. Once you're done, save it in **.pdf format** and upload it on Moodle.

Important: your submission should contain:

- One **.pdf** of your solutions to the mandatory exercises
- One **.pdf** of your solutions to the bonus exercises (**only** if you chose to do them)

In case you are having trouble saving your Jupyter Notebook in .pdf format, follow these instructions:

1. From JupyterLab: with you notebook open, go to **File > Save and Export Notebook as > PDF**
2. From JupyterNotebook: with you notebook open, go to **File > Save and Export Notebook as > PDF**

[3] We'll see what precisely *calling a function* means later in the course
[4] https://numpy.org/doc/stable/reference/generated/numpy.log2.html