

## **Exercise sheet 10 - Title**

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*Your preparation of exercises should include two aspects:*

*(1) Try to present exercises in a way that everyone can follow (even if that person didn't do the exercise at all), so please explain all the (vital) parts of your solution in a slow and comprehensive way.*

*(2) Try to also include some background information where applicable, and/or explain the possible context/motivation for the given exercise.*

*Please strive for that in all exercises to come. From now on this will also be part of the assessment.*

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1. In the latest lecture, the python library numba was introduced. Please use this library in your `primes.py` code from Exercise 7.4 and discuss the speed-up improvements. What is this library doing under the hood? Under which conditions can be applied? How does it compare to the C code?

Bonus: Using `matplotlib`, plot the speed-up improvements for different input values.

2. Write a simple python script that finds all files in a directory and determines their types. You may want to use the modules `glob` and `mimetypes` (or `python-magic`)
3. Using a python script find all environmental variables and write them to a text file.
4. Take some mathematical function of your choice and plot it using `Matplotlib`. Note that the plot should at least contain a label for each axis and a title. Save the plot to a file.
5. Consider the data table `rotcurve.txt` provided with this exercise. It contains data for a rotation curve for a galaxy with columns *r* for radius, *vel* for velocity and error in *vel*. Please read the file and plot that information (including the errors) with `matplotlib`.

Bonus: Plot a function that best describe the data.