

Warmup: Getting started

As first exercise for this lecture, you will have to install and set-up some software which will be required during the whole semester. Note that, in case of issues, try to first search for a solution on Google, as it might take us some time to answer you¹.

Exercise 1 Python & IDE

For the exercises we are using Python 3. Please install Python 3.7 or a newer version. If you use Windows or macOS, you can download Python from: <https://www.python.org/downloads/>. During the installation process please make sure to press the “Add Python X.X to your PATH” option. If you use Linux, use your usual repository manager. To test whether python is installed correctly, open a terminal and write `python --version`. If it gives you the version number you just installed, everything is ok.

You can either use a simple text editor like geany and the command line for programming or you install an Integrated Development Environment (IDE). As IDE we suggest to use Pycharm. You can download the free community edition from <https://www.jetbrains.com/pycharm/download/#section=windows>. During the installation process make sure to press the “Add launchers dir to the PATH”. For a more detailed explanation on how to install and setup Pycharm correctly, please see <https://support.foxtrotalliance.com/hc/en-us/articles/360025836112-How-To-Install-Setup-PyCharm-for-Python>.

Exercise 2 Package Manager and Libraries

We suggest to use a virtual environment to not clutter your system.

If you use Windows or macOS, to set up a virtual environment in Pycharm, go to File > Settings > Project > Project Interpreter, click the settings sign at the top right. Then, choose Virtualenv Environment on the left side and select New environment. The base interpreter should be your installed Python version.

If you use Linux, then we recommend to use `virtualenv` for creating virtual environments:

```
virtualenv -p python3 venv3
```

where `venv3` is the folder that will contain the virtual environment (any other name is also OK). You can use the same virtual environment for the whole semester; there is no need to create a new one for each exercise. You can activate at any time an environment with

```
source venv3/bin/activate
```

¹There are more students than tutor. Much more.

As package manager we suggest to use pip, which is included in the regular install of Python. To install a library you just need to type `pip install library_name` in the command line. All installed libraries can be viewed by typing `pip list`. Pycharm has an integrated command line, which you can find at the bottom of the window under the index tab **Terminal**.

You will need the libraries `numpy` and `matplotlib` for our exercises. Please install them.

Exercise 3 Loopless Clipping 无循环裁剪

You will hopefully find your very first programming exercise extremely simple. Download the archive provided in StudOn. It contains two files: `test.py` and `exercise_0.py`.

Start by completing the `clip` function in `exercise_0.py`. **Do not use loops, but conditional indexing**

When you run this file after completing the function, if you have installed `numpy` and `matplotlib` properly, a plot will be displayed.

To check whether the function is implemented correctly, run `test.py`. If everything goes well, you should get the following text (or equivalent) displayed:

```
$ python3 test.py
...
-----
Ran 4 tests in 0.000s

OK
```

Important note: When we write the unit test, we think about what can possibly go wrong in your code. However, teaching taught us that students can be very ingenious in finding new ways to make mistakes. Passing the unit test means only that it is very likely that the solution is correct – not more. This is why in addition to submitting your solutions to StudOn, you will also have to present them to a tutor.

Optional exercise: find out how to pass this unit test without returning a correct result (and without modifying the test file!)

Submit the python files to show everything is working correctly. **Never** include your virtual environment in your submission!