SCIENTIFIC COMPUTING WITH PYTHON

Scientific computing in Python is done using the **SciPy Stack** (https://scipy.org/). This term is used for a collection of packages developed for scientific computing. From this collection we will mainly use the following three packages during this lecture:

- **Numpy** (the basis)
  – provides the data type 'numpy.ndarray' (e.g., for matrices and vectors)
  – contains a huge amount of tools to perform all sorts of array manipulation

- **SciPy** (the core)
  – builds upon numpy
  – contains a huge amount of numerical methods (solving linear systems, optimization, integration, interpolation,...)

- **Matplotlib** (the visualizer)
  – allows to visualize results with high quality grafics (plots in 2d and 3d, images and videos,...)

Remarks:

- **Tutorial:** the official one can be found here: https://scipy-lectures.org/. The first chapter in this tutorial contains already enough to do the programming parts in this lecture.
- **Installation:** typically not needed! They are usually contained in the system-side Python installation or come along with the respective distribution (e.g., anaconda)
- **Import convention:** a program often starts with

```
import numpy as np
import scipy as sp
import matplotlib as mpl
import matplotlib.pyplot as plt
```

Solution: