1.2: Getting Started with Python

In this worksheet, we include the instructions to start with python. We will start with setting up Anaconda (a widely used distribution of python environment) which we will use throughout the course. All the future lab worksheets and assignments will be in a Jupyter-Notebook format.

The objectives of this worksheet are to get you:

(1) started with Anaconda distribution, which allow you to set the similar environment in any machine
(2) familiarise with different interfaces, how to launch them and close them, and,
(3) started with python as calculator and use of variables.

Table of Contents

1. Download and Install Anaconda
2. Launching different interfaces
3. IPython as Calculator
4. Create your first Jupyter-Notebook
5. Final Task

1.   Download and Install Anaconda

Anaconda Distribution is Free to download, which contain all the required python packages and libraries to start working on Data Science Task. Download from given link, according to your machine and install it.
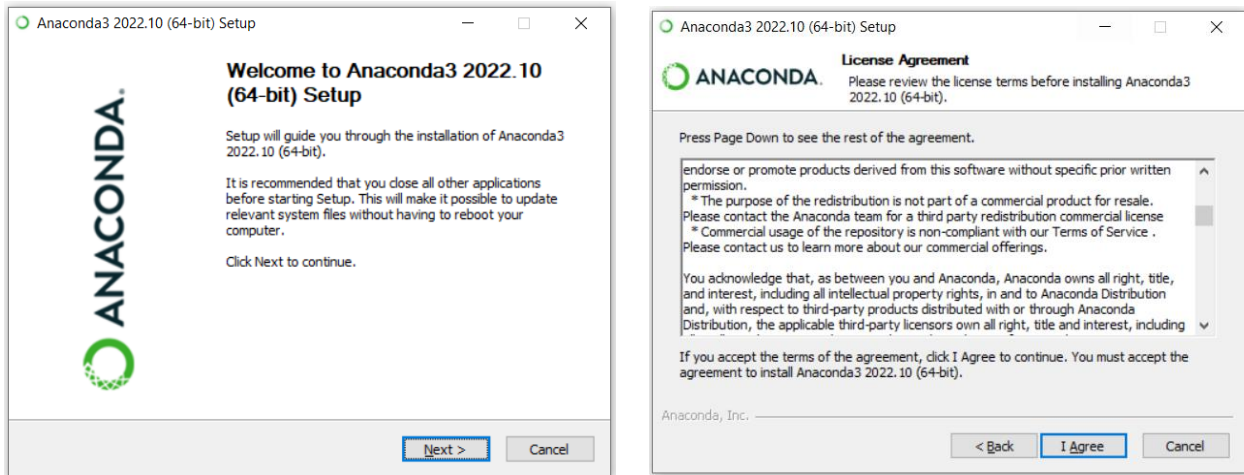
Links:

Anaconda: https://www.anaconda.com/download/

Installation documentation: https://docs.anaconda.com/free/anaconda/install/

Step 1: Once you downloaded the software, double click to install (window/mac). For Linux use bash command
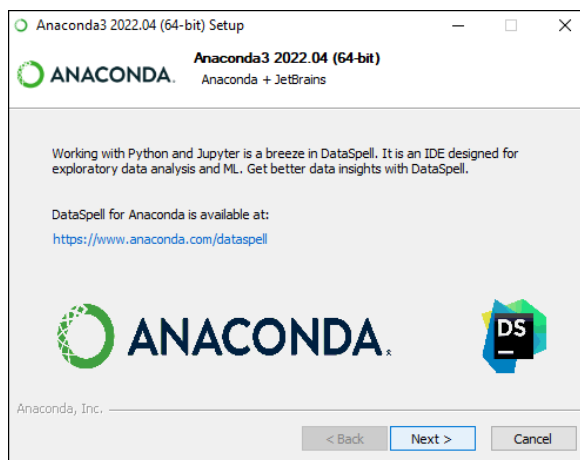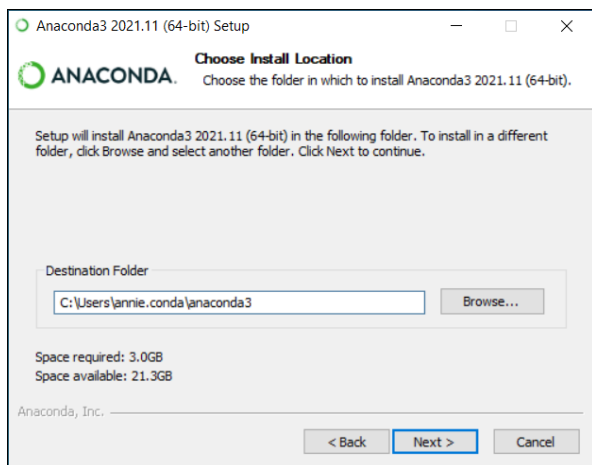
bash ~Download/Anaconda3-2020.05-Linux-x86_64.sh

Click next and Agree with the T&C and shown in figures below.

Step 2: If you are using University computer or one which is shared with other users, do select 'Just Me', as shown in figure.
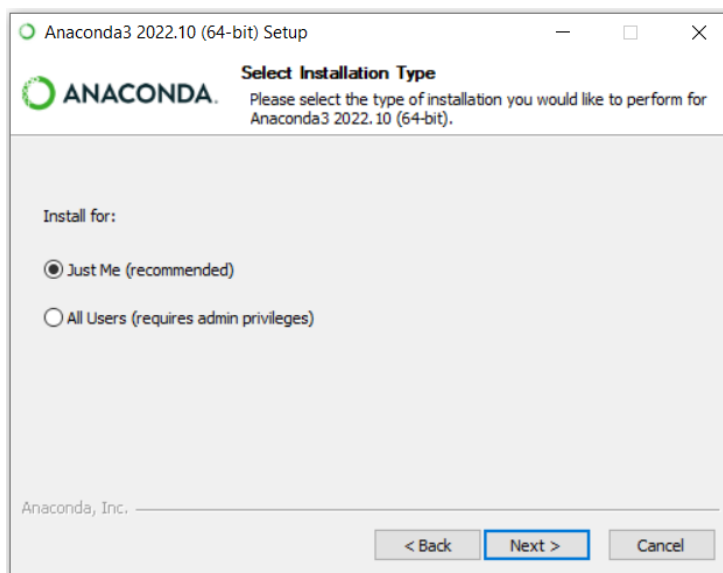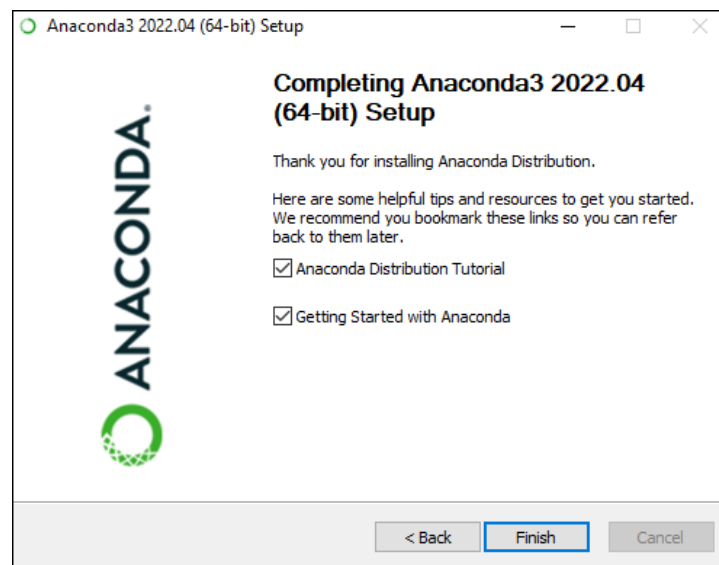
Step 3: Select the location and go ahead as shown in figures below.

Step 4: Select the Options. By Default, "***Add Anaconda3 to my PATH***" is not selected, However, we recommend you to select it as in the right side of the figure below. Selecting "***Add Anaconda3 to my PATH***" will make sure that your default python comes from Anaconda Distribution.
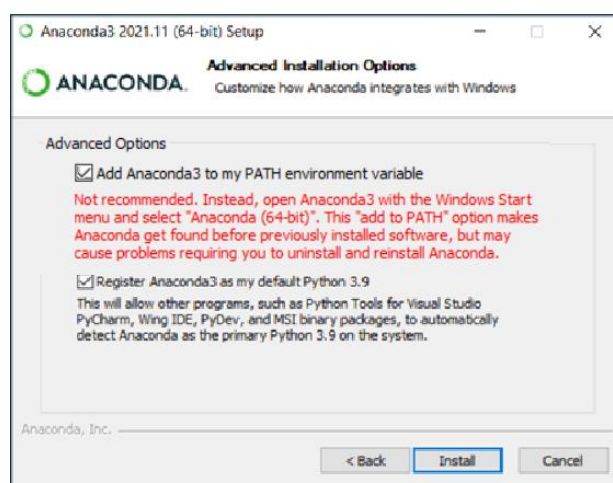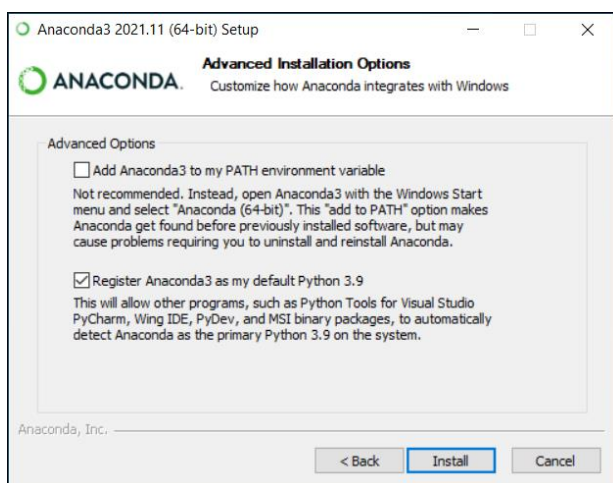
Step 5: Finish and Launch

Well Done!! You have now installed Anaconda in your computer.

2. Launching different interfaces

Anaconda comes with different interfaces to work with. Each interface comes with different feature. Anaconda is keep adding new interfaces to its distribution. Which interface you should use, is your personal choice. However, we will only walk through 4 different interfaces that you are most likely to see in different data science projects. Lab work sheets, assignments, and coursework for this Module will be provided in Jupyter-Notebook format. So, we will focus on Jupyter-Notebook more.

Before we discuss how to launch different interfaces, we need to know, what is command shell or 'Terminal' in general.
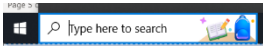
Command Shell/Terminal: Command shell is a usually black window to type command to execute an action. In windows there are two command shells: 'Command Prompt' and 'Powershell' and after installing Anaconda, one more command shell is added 'Anaconda Prompt'. Figure below shows how they look like.
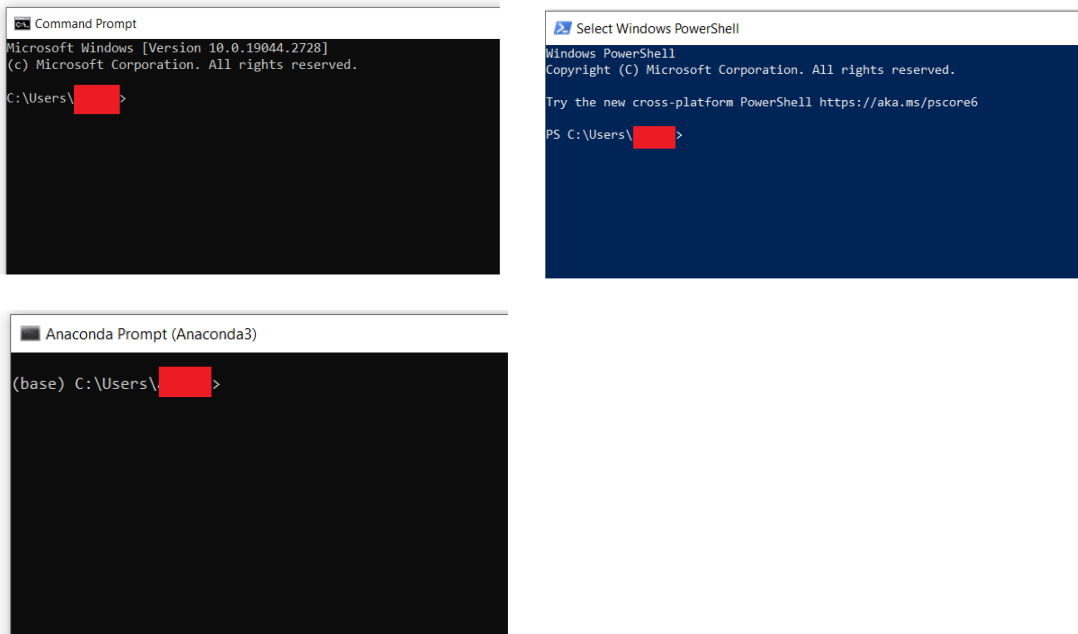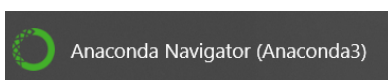

In Linux system, same thing is called Terminal or System Terminal. In general, they are called 'Terminal'

Launching Anaconda Navigator

Anaconda Navigator is a window that shows all the interfaces and tools that are included in Anaconda distribution.

To launch Anaconda Navigator, search 'Anaconda' in your app search Box and select Anaconda Navigator

 that will launch Anaconda Navigator as shown in figure below. It can also be launched by typing 'anaconda-navigator' on any Command shell.
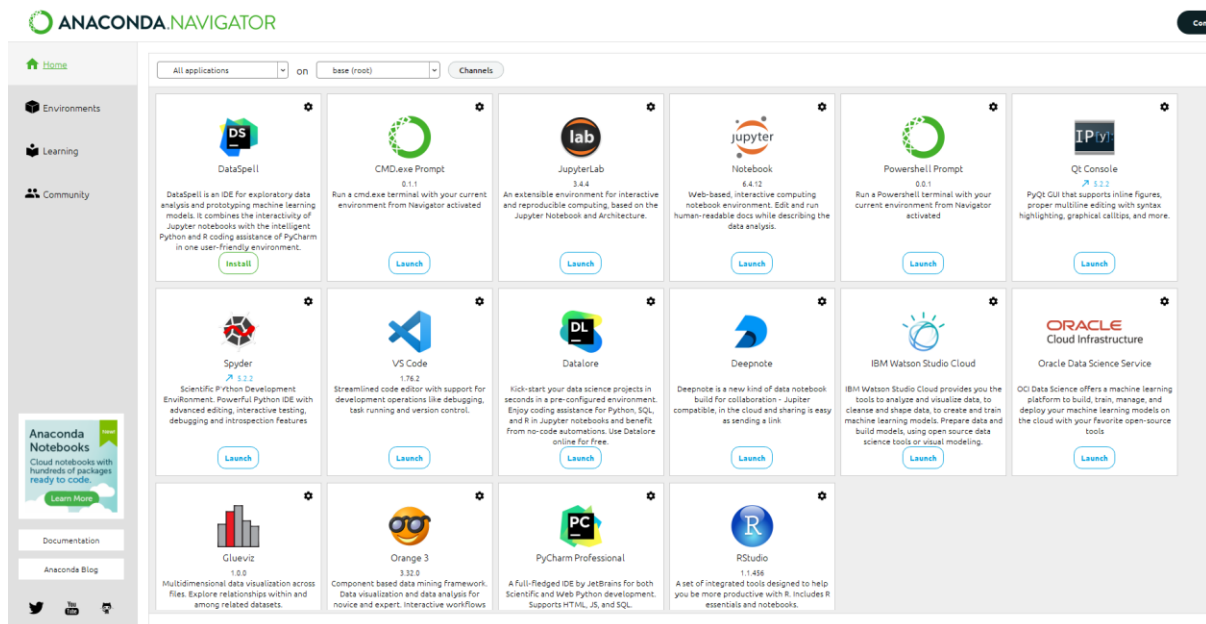
From this Navigator, you can select any tool or interface to launch

Launching IPython

IPython is an interactive Python terminal, which can be launched by simply typing 'ipython' on any command shell (Command Prompt, Powershell, Anaconda Prompt). It will look as in figure.
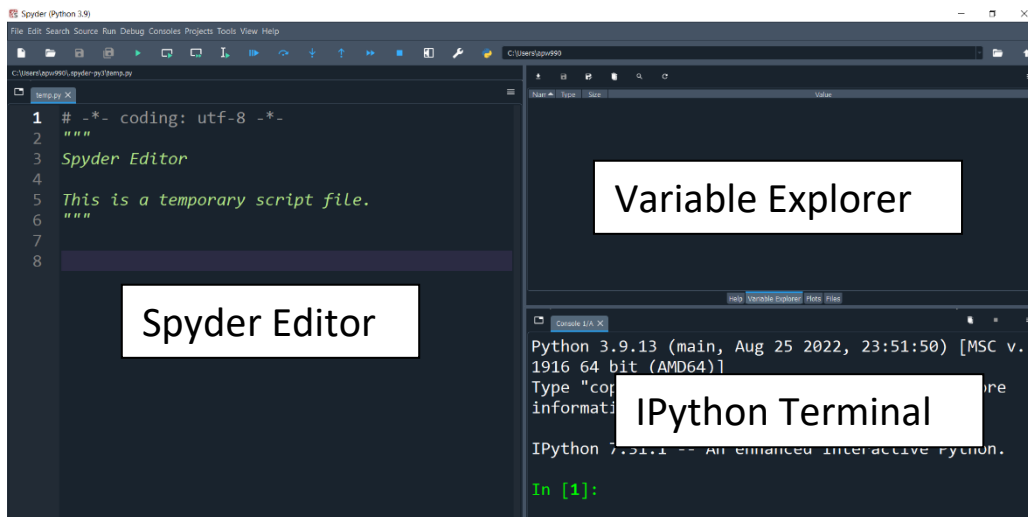

To shut-down or close, type exit on IPython terminal.

Launching Spyder

Spyder is an interface that look like MATLAB interface, which has three basic sections – IPython-terminal, Spyder-editor, Variable Explorer, as shown in figure below.

Spyder can be launched by simply typing 'spyder' on any command shell (Command Prompt, Powershell, Anaconda Prompt) or search spyder app in search-box.
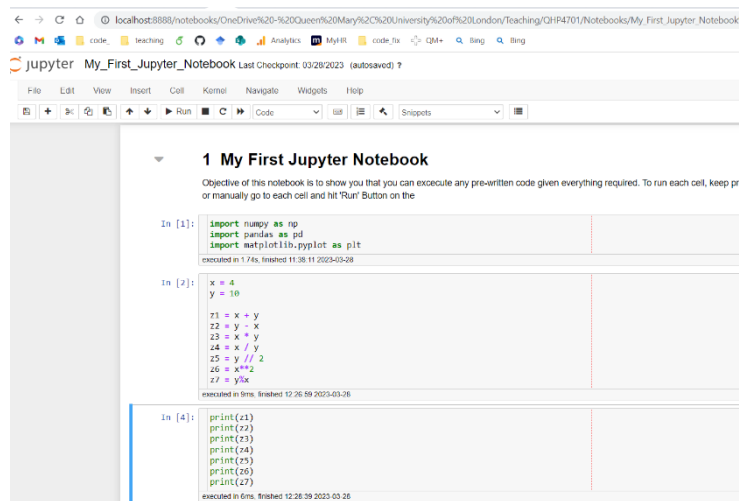
To shut-down or close, type exit on IPython terminal, then close the spyder.

Launching Jupyter-Notebook

Jupyter-Notebook is the widely used interface, which we will use in our module. It runs in Browser (Internet Explorer, Microsoft Edge, Firefox, etc).

The advantages of Jupyter-notebook are that it allows users to add Text, Image, links, along side the small sections that contain python code, which can be executed, and results can be plotted and displayed in the same notebook. It is used widely, because one can create a report of a project alongside the executable codes inside one file. We will explore the benefits of Jupyter-notebook further in class and labs.

Jupyter-notebook can be launched by simply typing 'jupyter-notebook' on any command shell (Command Prompt, Powershell, Anaconda Prompt) or search Jupyter-notebook app in search-box.

To shut-down or close, go to terminal used to launch jupyter-notebook and press 'ctrl+C' and then close all the notebooks. Make sure the changes of jupyter-notebook are saved before you close them.

Launching Jupyter-Lab

Similar to Jupyter-Notebook, Jupyter-Lab is browser-based interface, that has launcher and files side-be-side.

Jupyter-Lab can be launched by simply typing 'jupyter-lab' on any command shell (Command Prompt, Powershell, Anaconda Prompt) or search Jupyter-lab app in search-box. Unlike Jupyter-notebook, all the notebooks in Jupter-lab are opened inside one browser-tab.
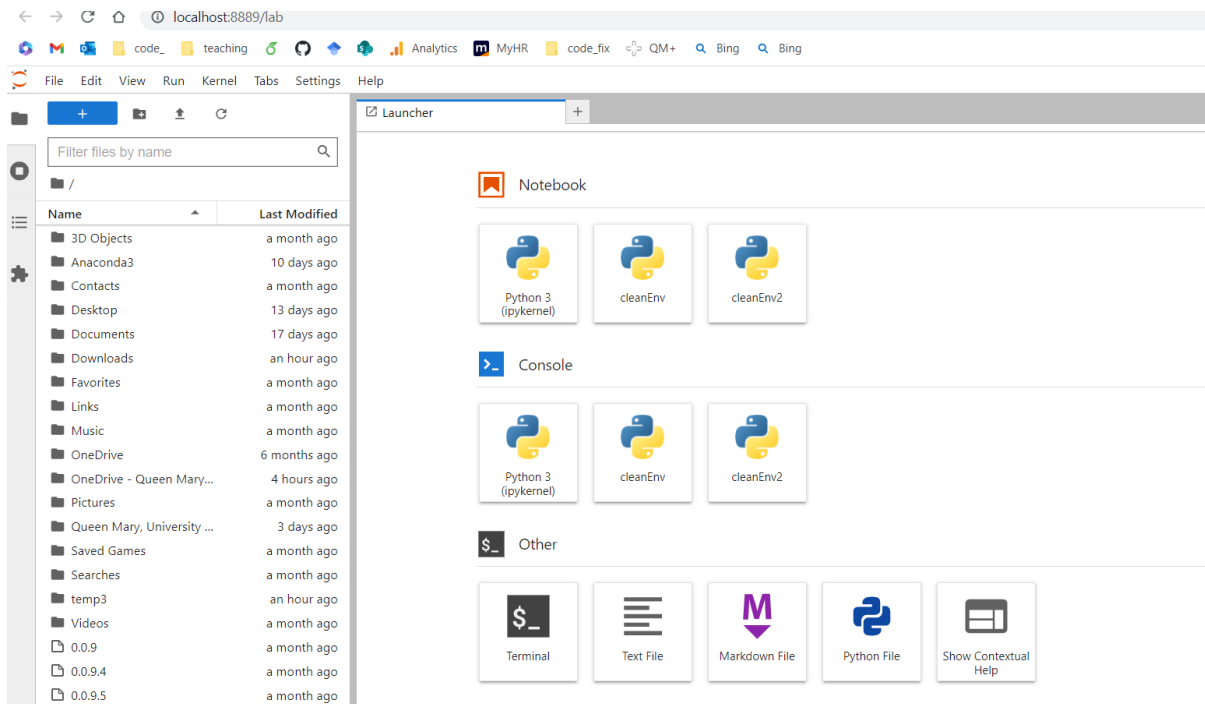
To shut-down or close, go to terminal used to launch jupyter-lab and press 'ctrl+C' and then close the browser window of jupyter-lab. Make sure the changes of jupyter-notebook are saved before you close them.

3. IPython as Calculator

Launch IPython terminal and try following operations

- Add/subtract/multiply/divide two numbers (take any two numbers)
- Compute 3^{10}
- Try: 45/0
- Compute: 10/3 and 10//3, observe the difference.
- Try following modulus operations
  - 10%2
  - 11%2
  - 5%20
- Compute: $3(2+10) + 2^3/4$

- Compute square root of 10
- Compute: $5^{1/2}/10^{1/3}$
- Try following operations and think what they mean:
  - 10%3 and 10%-3
  - 5%1 and 100%1
- **Use variable assignments to repeat above operations**
- **For x=2, y = 3, compute z**
- $z = \dfrac{x^2+y^2}{\sqrt{xy}} + x^{-\frac{1}{3}} + (xy)^{-\frac{1}{3}x}$

4. Create your First Jupyter-Notebook

Launch Jupyter-Notebook, select appropriate folder, create folder named – '**QHP4701'** and create a new notebook.

Name your notebook – 'My_First_Jupyter_Notebook'

Perform all the operations with proper heading and text. Include any observations you might have.

- Add/subtract/multiply/divide two numbers
- Compute 2^3, 2.5^{10}, 10^{100}
- Try: 5/0
- Compute: 10/3 and 10//3, observe the difference and write about it in your notebook.
- Try following modulus operations
  - 10%2
  - 11%2
  - 5%20
- Compute: 3(2+10) + 2^3/4
- Compute square root of 10
- Compute: $5^{1/2}/10^{1/3}$
- Try following operations and think what they mean:

- 10%3 and 10%-3
- 5%1 and 100%1
- **Use variable assignments to repeat above operations**
- **For x=2, y = 3, compute z**
- $z = \frac{x^2+y^2}{\sqrt{xy}} + x^{-\frac{1}{3}} + (xy)^{-\frac{1}{3}x}$
- **Copy and paste following**
  - print('Hello'*10)
  - print ('Welcome to | ' + 'Data Science '*100)
  - print('你好吗？ '*10)
- **Print '100010' 1000 times**
- It is said that person's name is the sweetest sound of all. Let's see if that looks as good as it sounds. **Print your name 50 times**

5. Final Task

Compute the average age and average height of individuals from the **Table 1.1: Example of Dataset,** in the *Lecture Slides 1.1* on slide *number 43*. Download Slides from QM+.

- Average age
- Average height