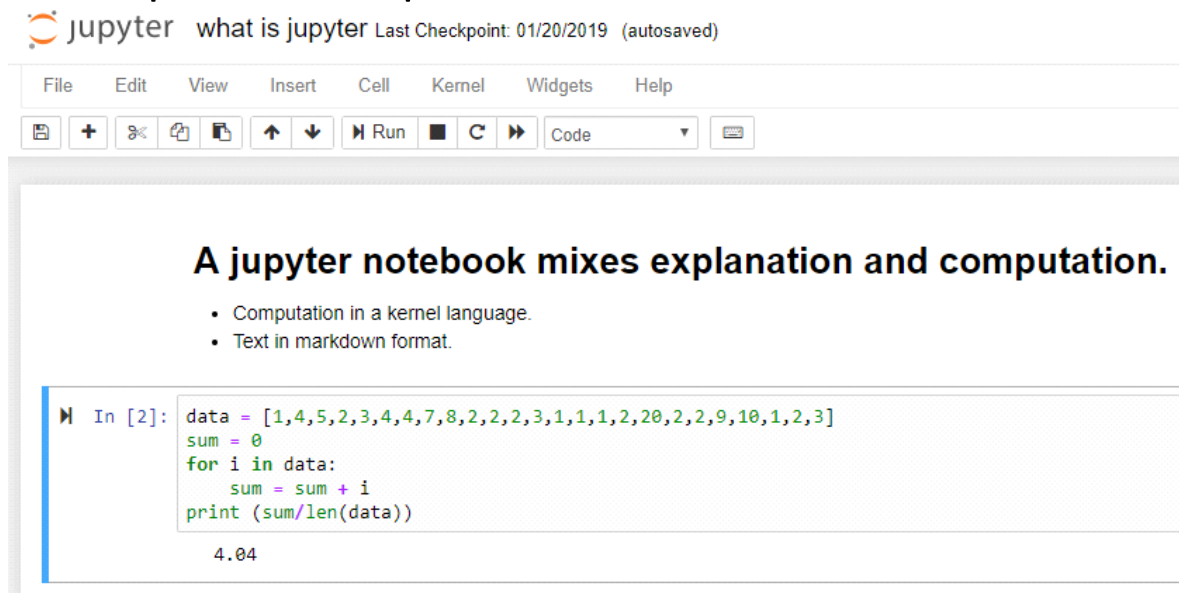


# What is a Jupyter Notebook?

Saturday, May 4, 2019 8:39 PM

An environment for mixing computations and explanations.

- Computations in one of many computer languages.
- Explanations in "markdown" language for simple text markup. For example:



- This notebook contains one "markdown cell" and one "computation" cell.
- The "markdown" cell contains explanatory text.
- The "computation" contains computer language.
- The results of a computation cell are printed after the cell. For example, the average of the numbers is 4.04.

Several important Jupyter concepts:

- Cells
- The Kernel
- Execution controls

## Cells

- There are two kinds of cells in Jupyter

- Cells that contain computer language, e.g.,

```
In [2]: data = [1,4,5,2,3,4,4,7,8,2,2,2,3,1,1,1,2,20,2,2,9,10,1,2,3]
sum = 0
for i in data:
    sum = sum + i
print (sum/len(data))

4.04
```

- Cells that contain text, e.g.,

**A jupyter notebook mixes explanation and computation.**

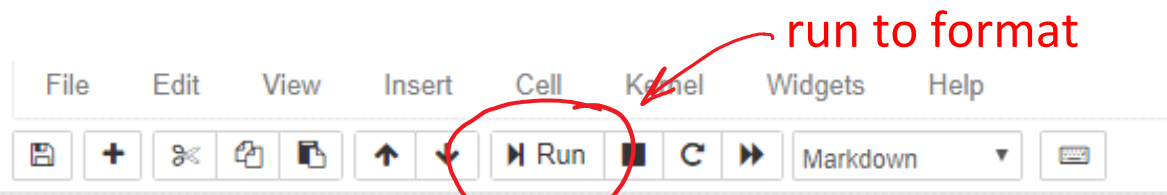
- Computation in a kernel language.
- Text in markdown format.

## Text cells

- To edit a text cell, double-click on the cell. It will change format:

```
# A jupyter notebook mixes explanation and computation.
* Computation in a kernel language.
* Text in markdown format.
```

- In this format:
  - Starting a line with # makes it a heading.
  - ## and ### create sub-headings.
  - Starting a line with \* makes a bullet item.
  - Starting a line with 1. or another number makes a numbered list item.
- To see what you wrote in formatted form, press the run button on the control strip above:



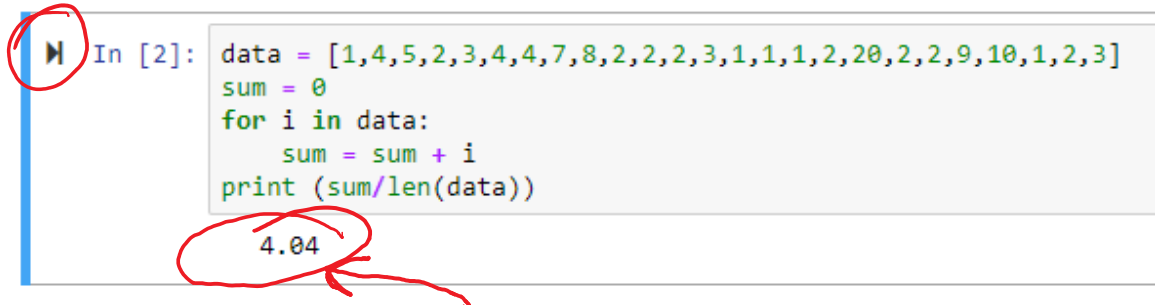
Then the cell will return to its prior appearance:

## A jupyter notebook mixes explanation and computation.

- Computation in a kernel language.
- Text in markdown format.

### Computation cells

- Written in a computer language
- Results are shown immediately after the code.
- The default behavior is to print the last value computed.



The screenshot shows a Jupyter notebook cell. On the left, there is a blue vertical bar with a play button icon (a right-pointing triangle) circled in red. To the right of the icon, the text "In [2]:" is followed by Python code: `data = [1,4,5,2,3,4,4,7,8,2,2,2,3,1,1,1,2,20,2,2,9,10,1,2,3]`, `sum = 0`, `for i in data:`,  `sum = sum + i`, and `print (sum/len(data))`. Below the code, the output "4.04" is displayed and circled in red. A red arrow points from the text "The result of the computation" to the output "4.04".

The result of the computation

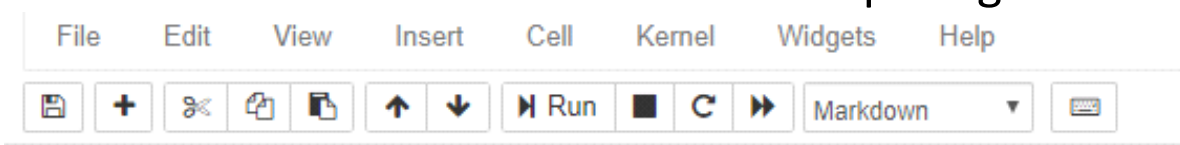
- A button at left allows one to execute the cell contents:






### The Kernel

- The "Kernel" of a Jupyter notebooks page refers to the language in which compute cells are written.
- By default, this language is Python.
- The "py" in "Jupyter" refers to Python.
- Many other kernels are available, most notably, for R and Matlab.
- The Python kernel for Jupyter is not quite Python. It is a specially adapted version for interactive use, called "iPython".

There are several buttons that control computing:

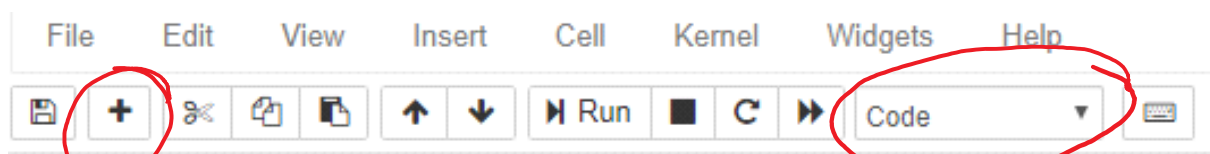


	Stop a computation in progress.
	Restart the kernel. Delete all results of computations and start over.
	Restart the kernel and execute all cells.

Expert note: *make sure to press the last one before you submit any notebook, because I am going to do that before I grade it!* If it doesn't work, you will need to do the assignment over! We will discuss exactly why this is important later.

### Creating a new cell

- Click on an existing cell to activate it.
- Click '+' to add a new cell below the active cell.



- Use the dropdown at right to choose the cell type.