Line Graphs using matplotlib

- Your scientist has asked you to plot the following two functions:

$$y_1 = 2x - 5$$
$$y_2 = -0.3x^2 + 15$$

- The domain for both functions is $-10 \leq x \leq 10$
- You should plot both curves on the same graph

https://matplotlib.org

matplotlib

Version 3.3.3

Installation Documentation Examples Tutorials Contributing

home | contents » Matplotlib: Python plotting

Matplotlib: Visualization with Python

Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python.

Matplotlib makes easy things easy and hard things possible.

Create

- Develop publication quality plots with just a few lines of code
- Use interactive figures that can zoom, pan, update...

Customize

- Take full control of line styles, font properties, axes properties...
- Export and embed to a number of file formats and interactive environments

Extend

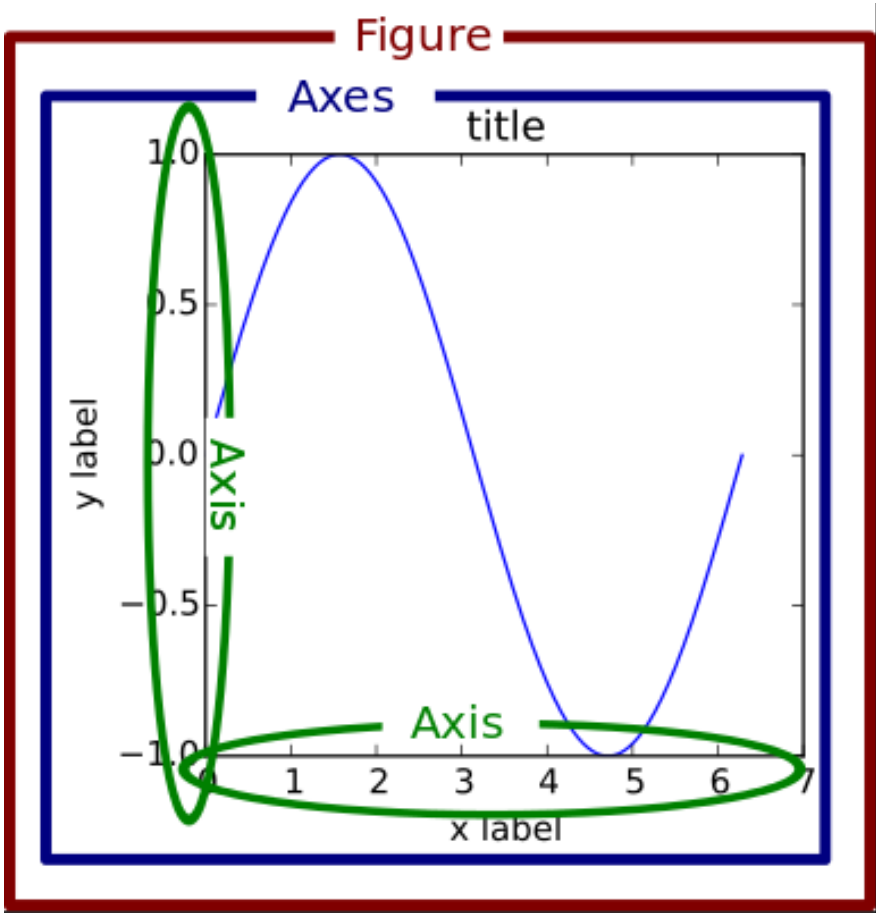
- Explore tailored functionality provided by third party packages
- Learn more about Matplotlib through the many external learning resources

Documentation

To get started, read the User's Guide.

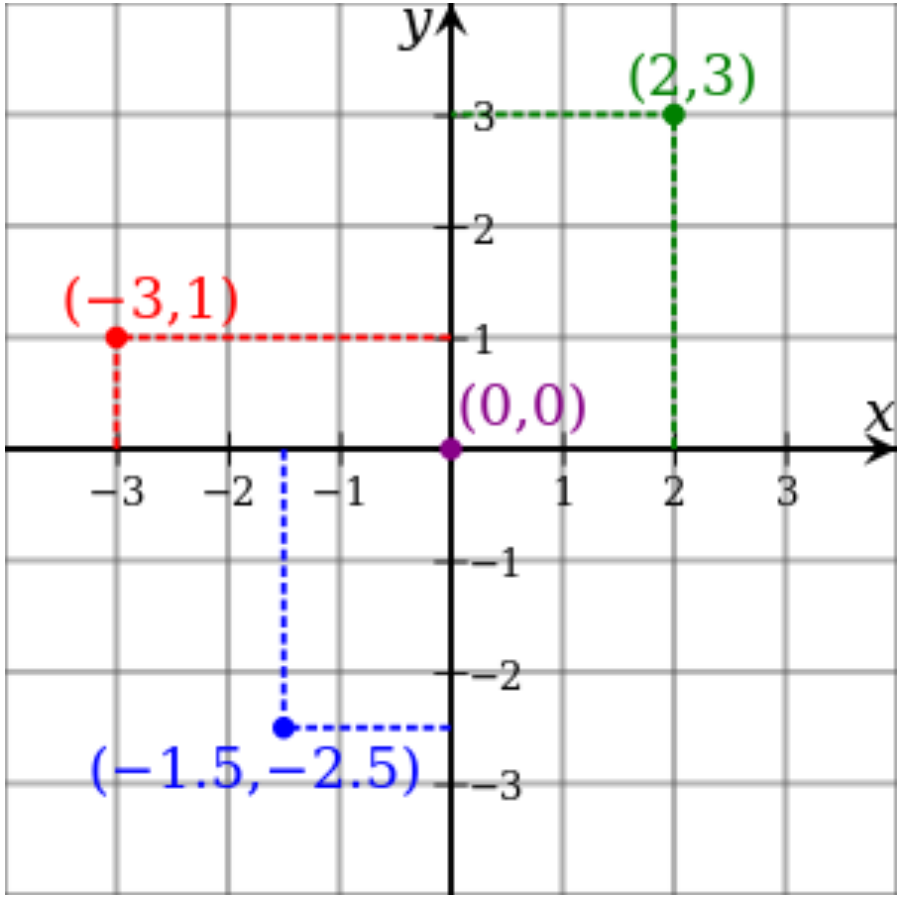
Trying to learn how to do a particular kind of plot? Check out the examples gallery or the list of plotting commands.

Matplotlib Container Hierarchy



Cartesian Coordinates

Created by
René Descartes
in 1637



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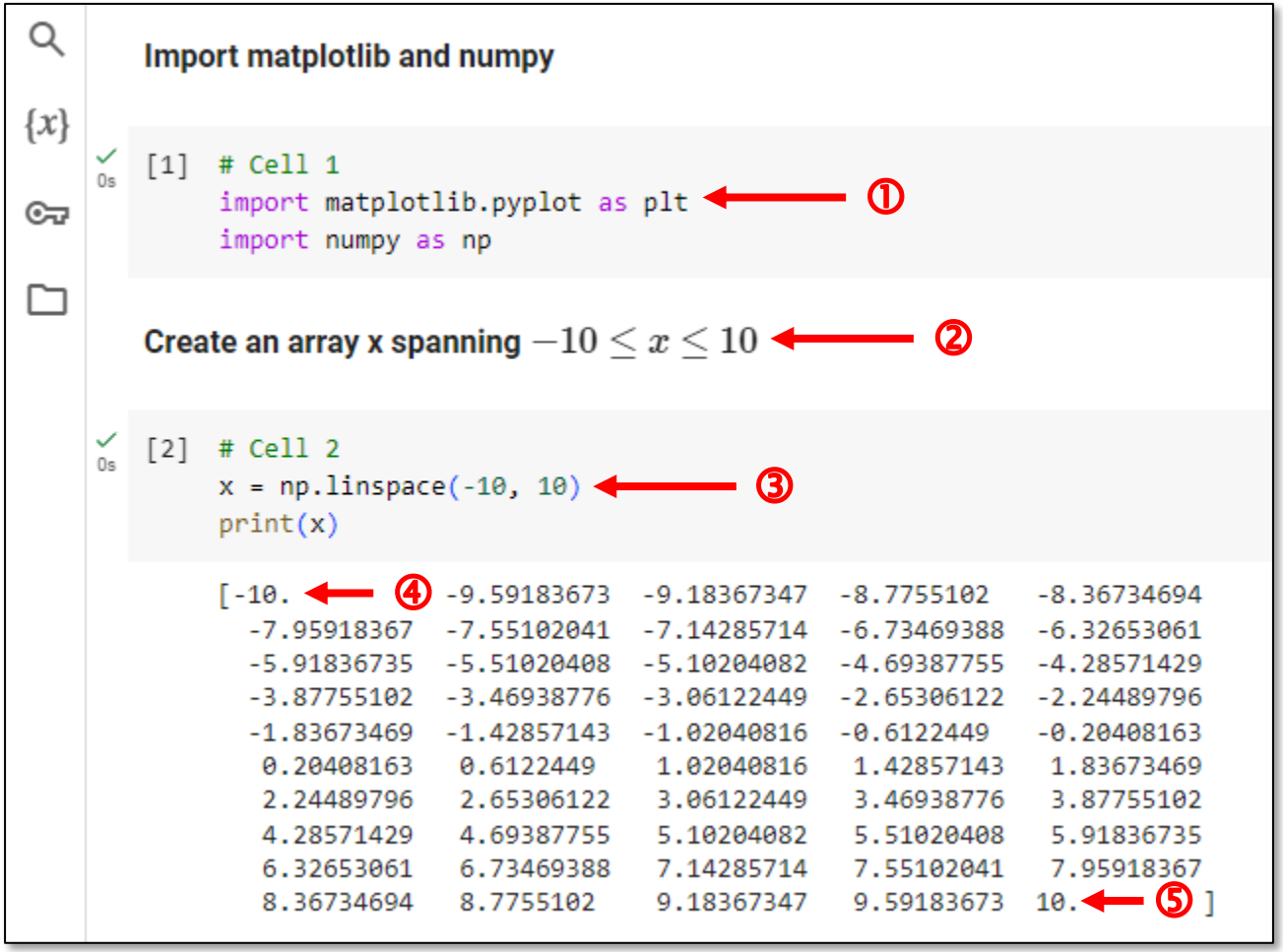
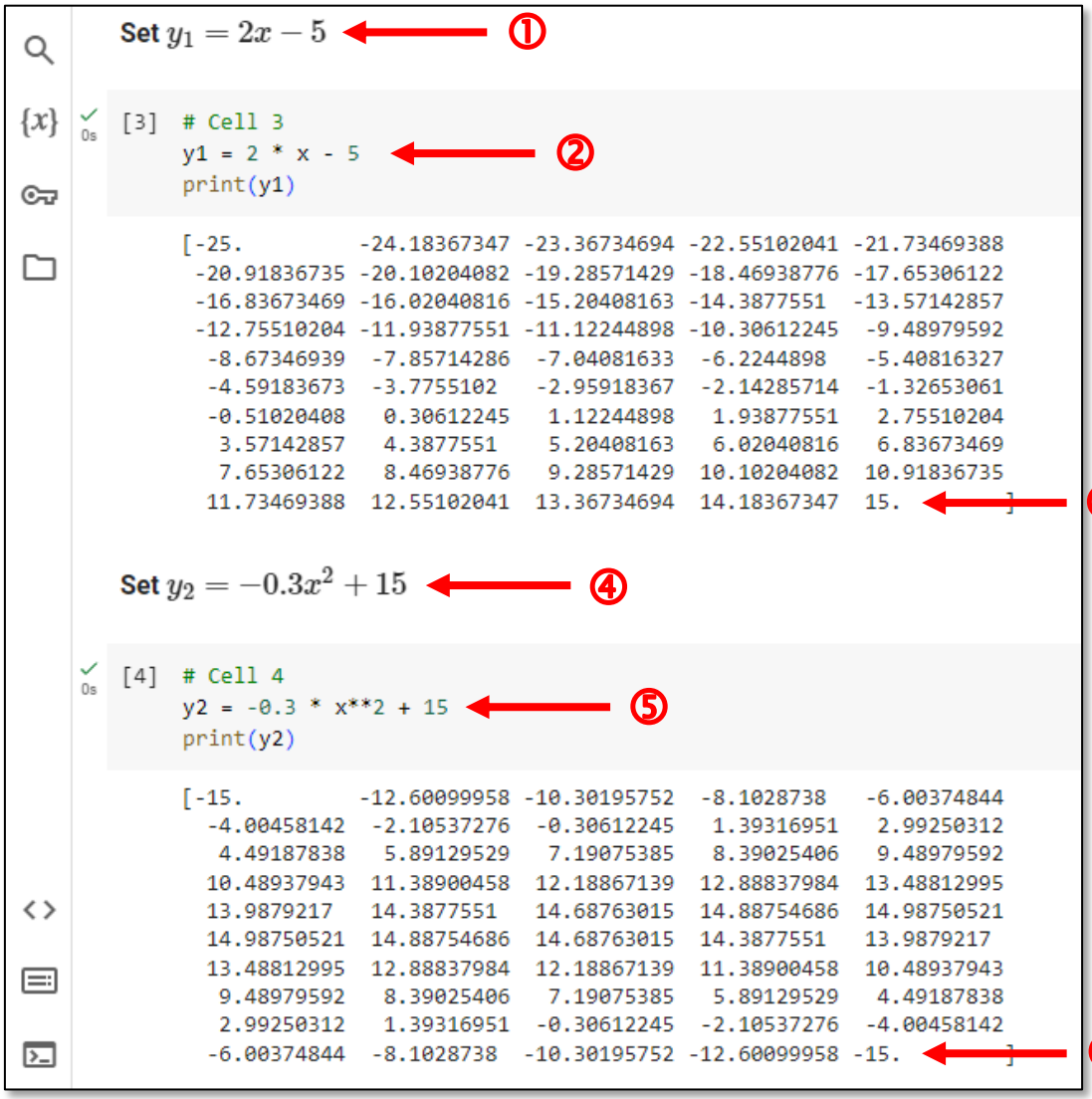
Edit line_graphs.ipynb – **Cells 1...2**



Edit line_graphs.ipynb – **Cells 3…4**



$= 2(10) - 5$

$= 20 - 5$

$= 15$

$= -0.3(10^2) + 15$

$= -0.3(100) + 15$

$= -30 + 15$

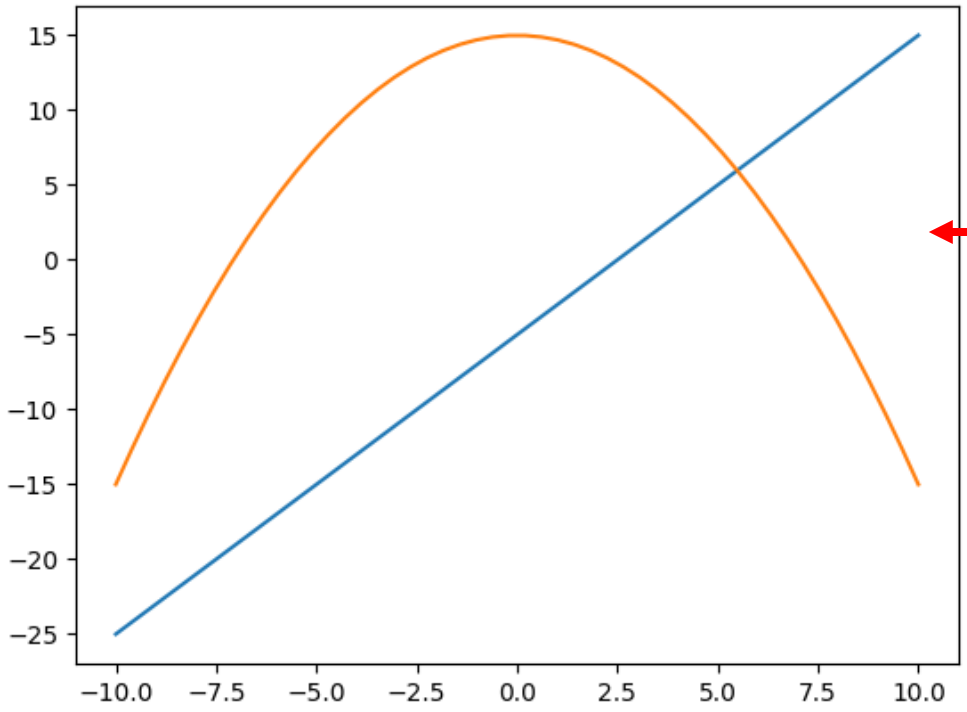
$= -15$

Edit line_graphs.ipynb – **Cell 5**

Create one graph that plots both $y1(x)$ and $y2(x)$ ①

```
# Cell 5
plt.plot(x, y1)
plt.plot(x, y2)
plt.show()
```

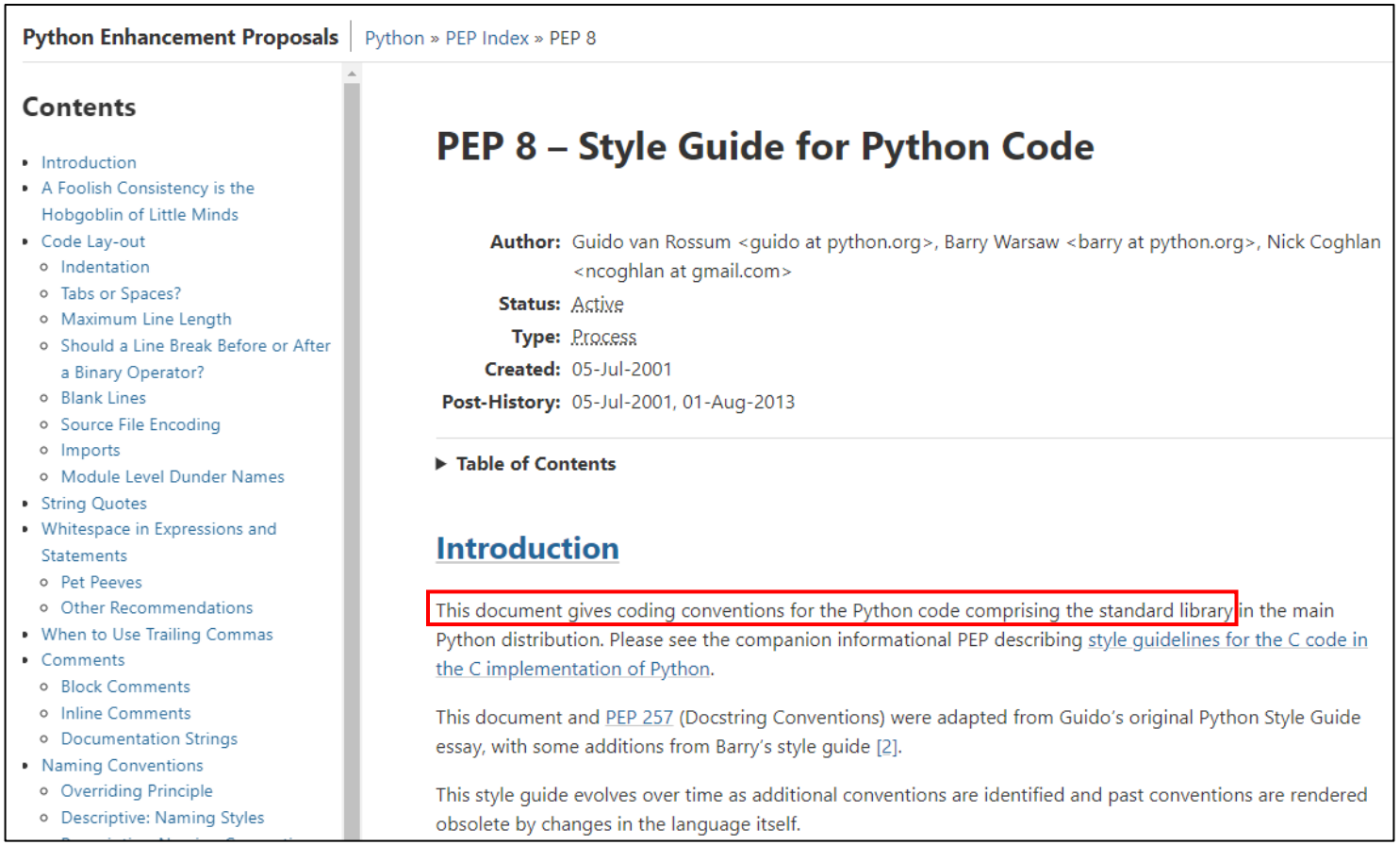
②



③

PEP 8 – Style Guide for Python Code

https://peps.python.org/pep-0008



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PEP 8 – Style Guide for Python Code

Author: Guido van Rossum <guido at python.org>, Barry Warsaw <barry at python.org>, Nick Coghlan <ncoghlan at gmail.com>

Status: Active
Type: Process
Created: 05-Jul-2001
Post-History: 05-Jul-2001, 01-Aug-2013

▶ **Table of Contents**

Introduction

This document gives coding conventions for the Python code comprising the standard library in the main Python distribution. Please see the companion informational PEP describing style guidelines for the C code in the C implementation of Python.

This document and PEP 257 (Docstring Conventions) were adapted from Guido's original Python Style Guide essay, with some additions from Barry's style guide [2].

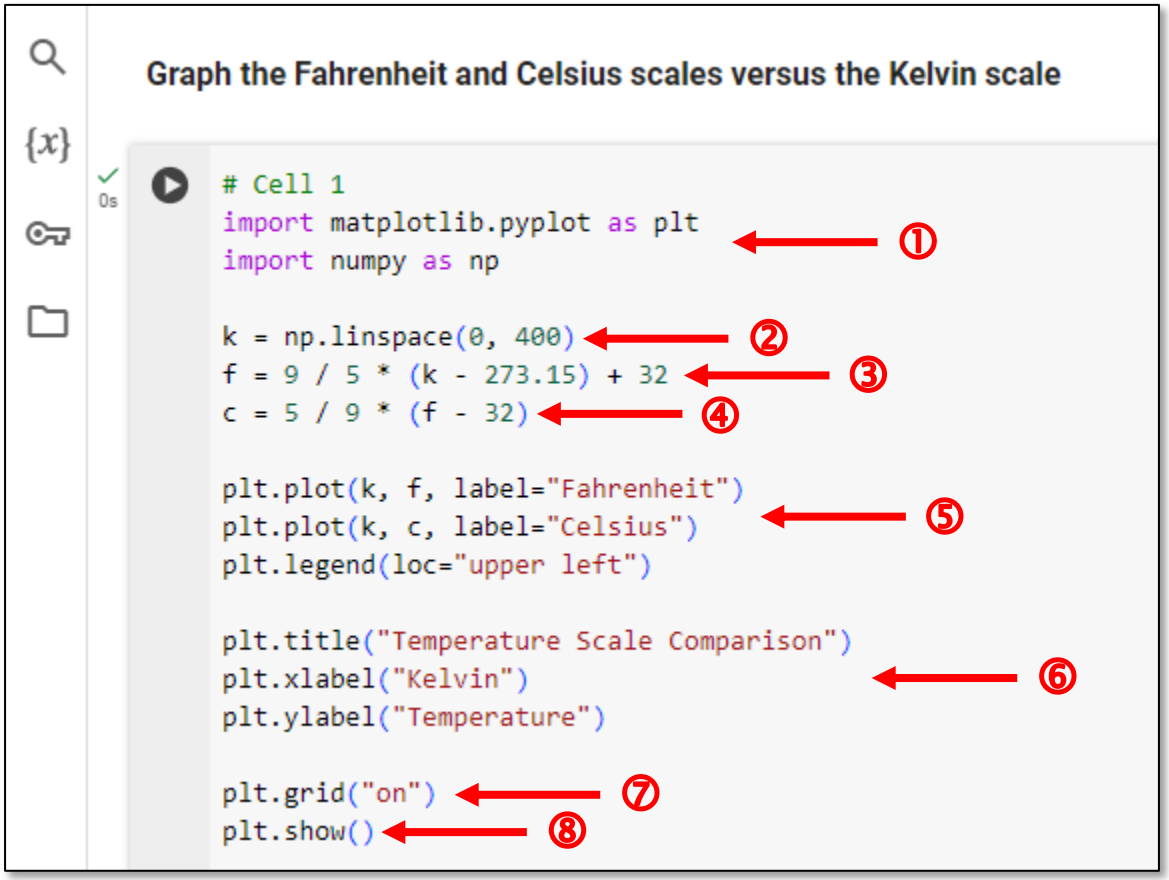
This style guide evolves over time as additional conventions are identified and past conventions are rendered obsolete by changes in the language itself.

Temperature Conversion

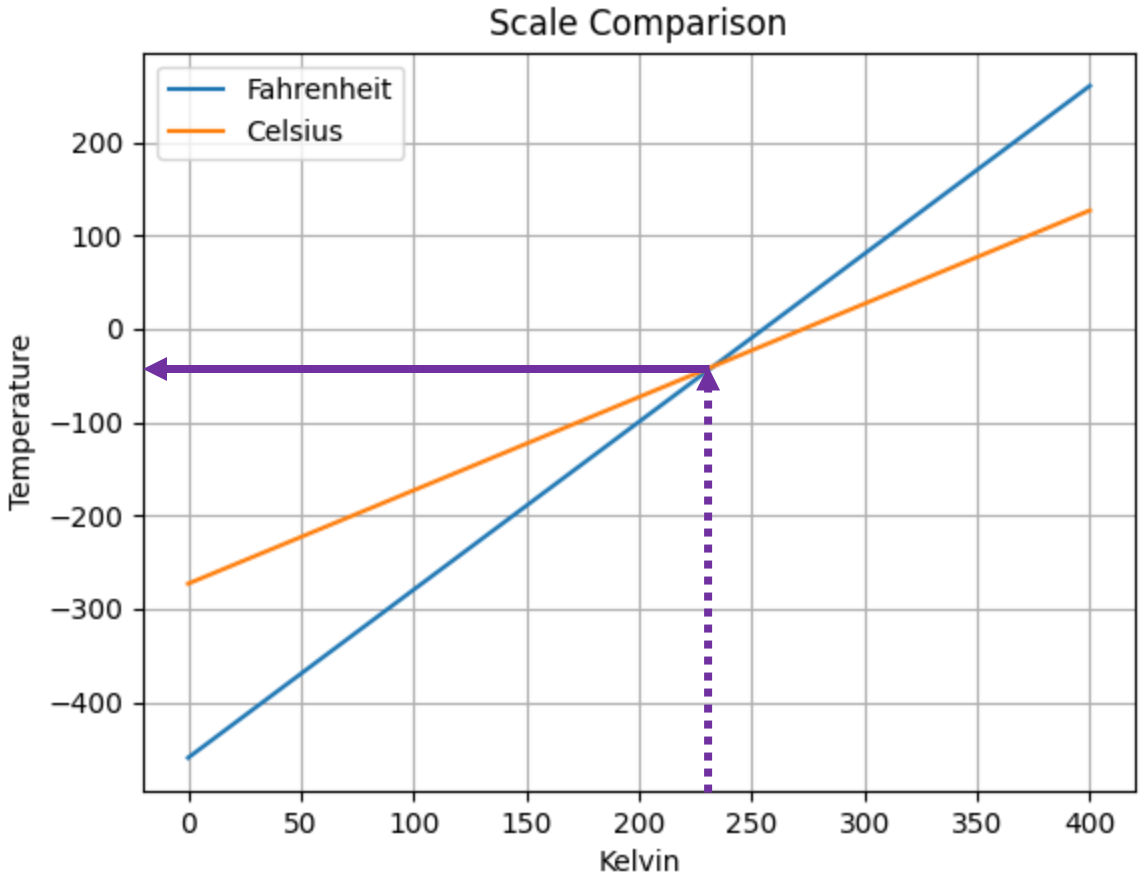
- Your scientist has asked you to plot the Fahrenheit and Celsius temperature equivalents for temperatures in Kelvin that span from 0K to 400K
- Your plot should label each temperature scale line graph so a legend can be added to the plot
- As with all professional graphs, each axis should be labeled with the appropriate units
- The graph should have a title and a grid for easier reading of the values
- The research question is, "**What is the one temperature that is the same in both Fahrenheit and Celsius?**"

Open fahrenheit_to_celsius.ipynb – **Cell 1**

Note: You should not edit this file!



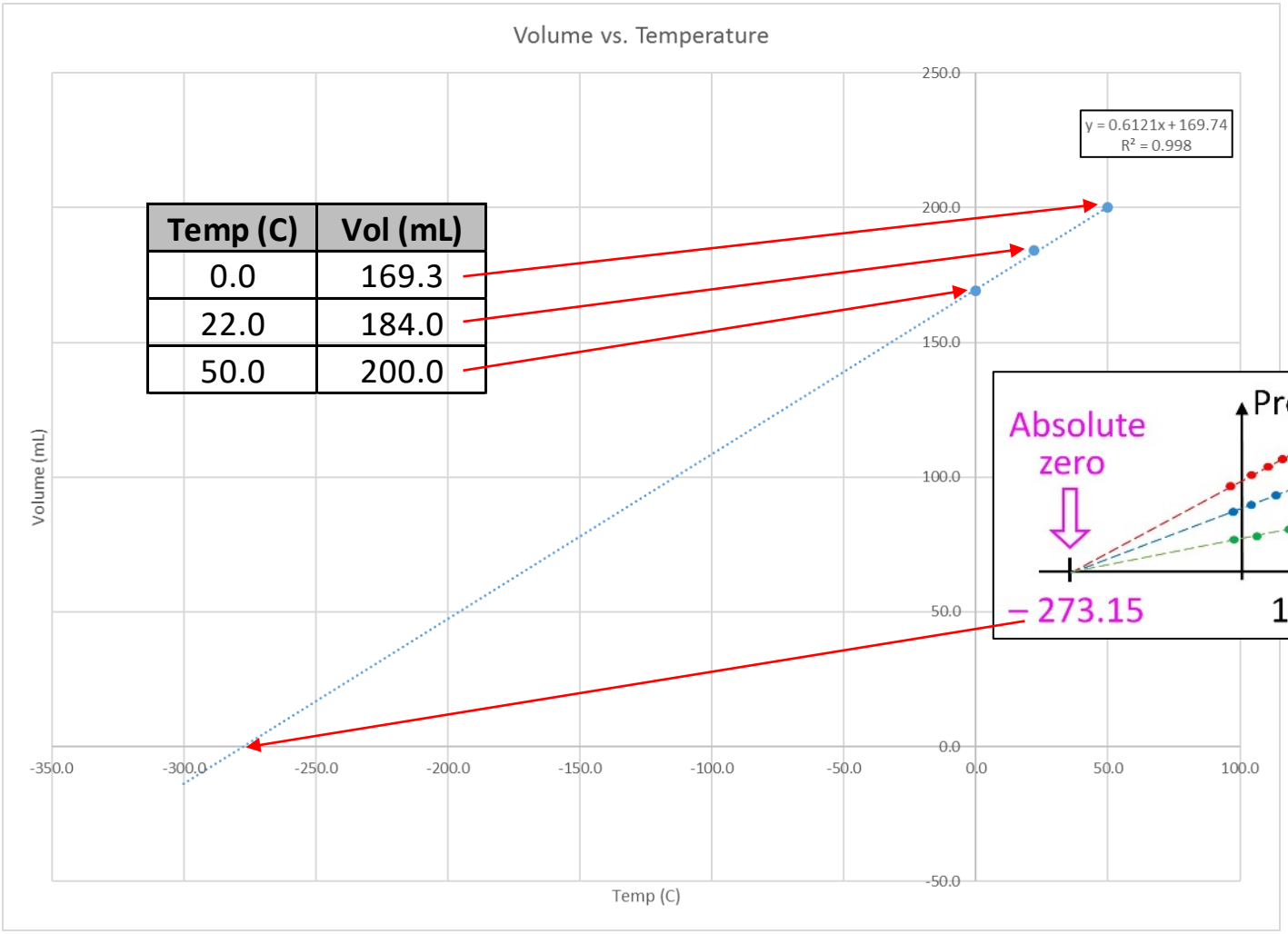
Run fahrenheit_to_celsius.ipynb – **Cell 1**



-40°

What is the one temperature that is the same in Fahrenheit and Celsius?

How did we calculate absolute zero in **1779**? (PV = nRT)



Task 03

- Update the code in **plot_quintic.ipynb** to graph this polynomial:

$$y = x^5 - 2x^4 - 120x^3 + 22x^2 + 2119x + 1980$$

- The domain should be $-10 \leq x \leq 12$
- If you prefer, you can use this equivalent expression for y:

$$y = (x + 9)(x + 4)(x + 1)(x - 5)(x - 11)$$

- What does the **Fundamental Theorem of Algebra** tell us about the **maximum** number of places $y(x)$ *might* cross the **x-axis** in the domain of real $(\mathbb{R})$ numbers?