Debugging & Matplotlib

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Matplotlib

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- Line plots
- Scatter plots
- Bar plots
- 3D plots
- ...

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Allows you to customize your plots.

Matplotlib - HowTo

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  - Global state-based interface mode
  - like MATLAB
  - not recommended (but always used on the internet)

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Matplotlib has two modes:

- Implicit mode
- Explicit mode
  - Object-oriented (OO) interface
  - Build up the visualization in an instance of *figure.Figure*
  - **Recommended to use!**

Implicit mode

```
import matplotlib.pyplot as plt
plt.plot([1, 2, 3, 4], [0, 0.5, 1, 0.2])
```

Matplotlib - HowTo

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import matplotlib.pyplot as plt
plt.plot([1, 2, 3, 4], [0, 0.5, 1, 0.2])
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Explicit mode

```
import matplotlib.pyplot as plt
fig = plt.figure()
ax = fig.subplots()
ax.plot([1, 2, 3, 4], [0, 0.5, 1, 0.2])
```

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- More control over your plots
- If you have to work on an old unreferenced axes
- Third party often uses explicit mode

Matplotlib - Example

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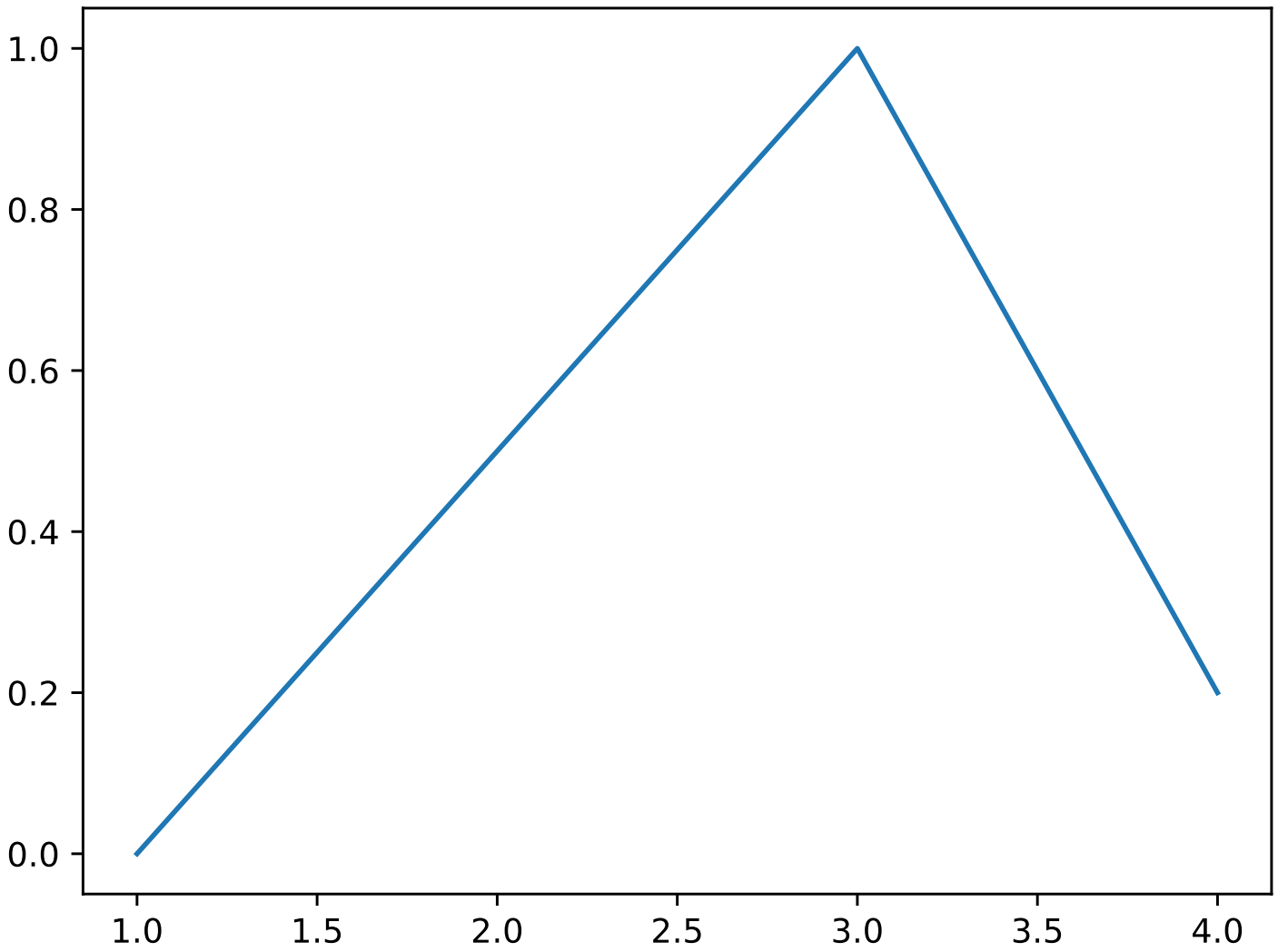
import matplotlib.pyplot as plt

fig = plt.figure()
ax = fig.subplots()
ax.plot([1, 2, 3, 4], [0, 0.5, 1, 0.2])
```

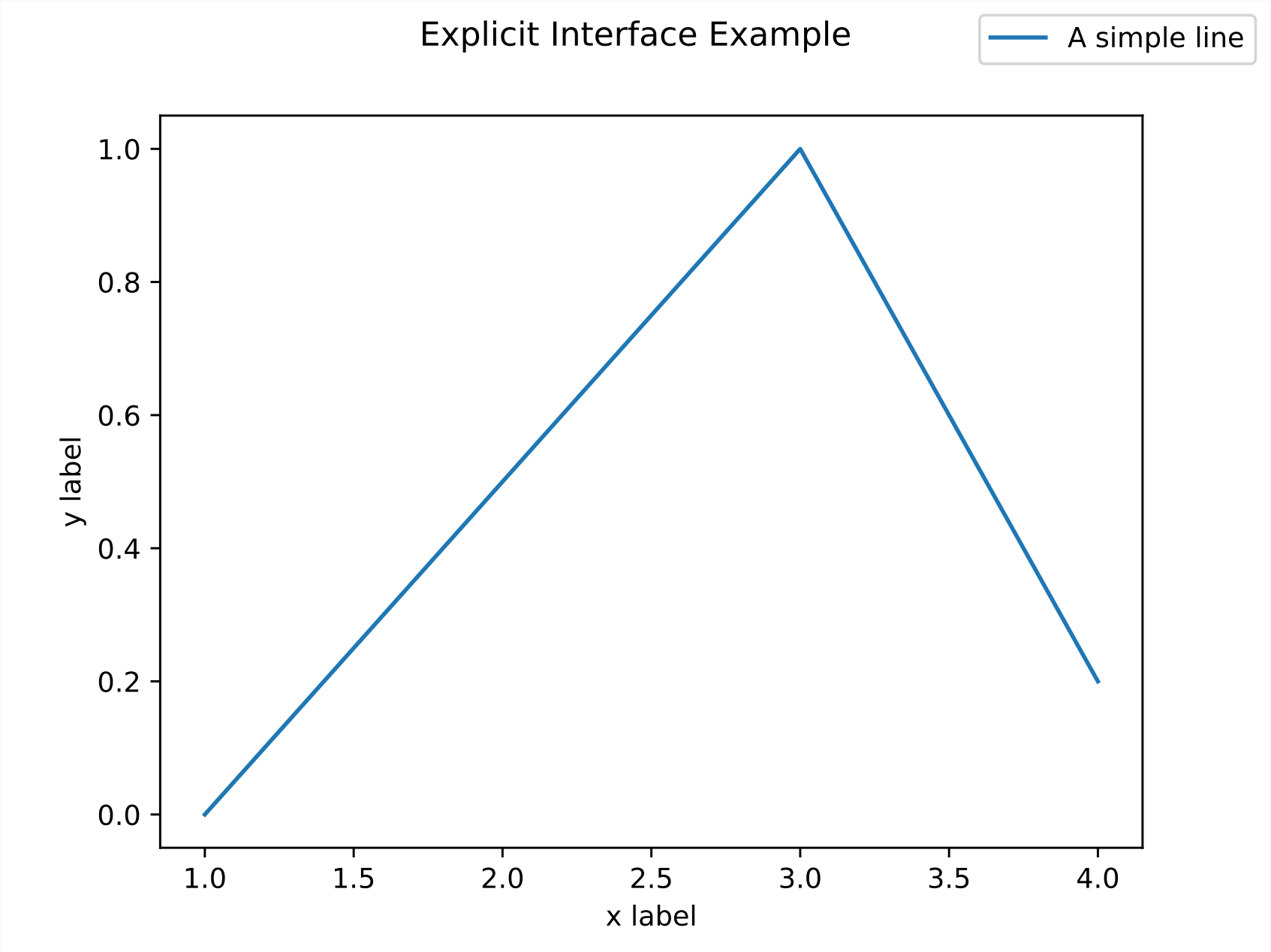
Matplotlib - Example



Matplotlib - Example

```
# Add some text to the figure
fig.suptitle('Explicit Interface Example')
ax.set_xlabel('x label')
ax.set_ylabel('y label')
```

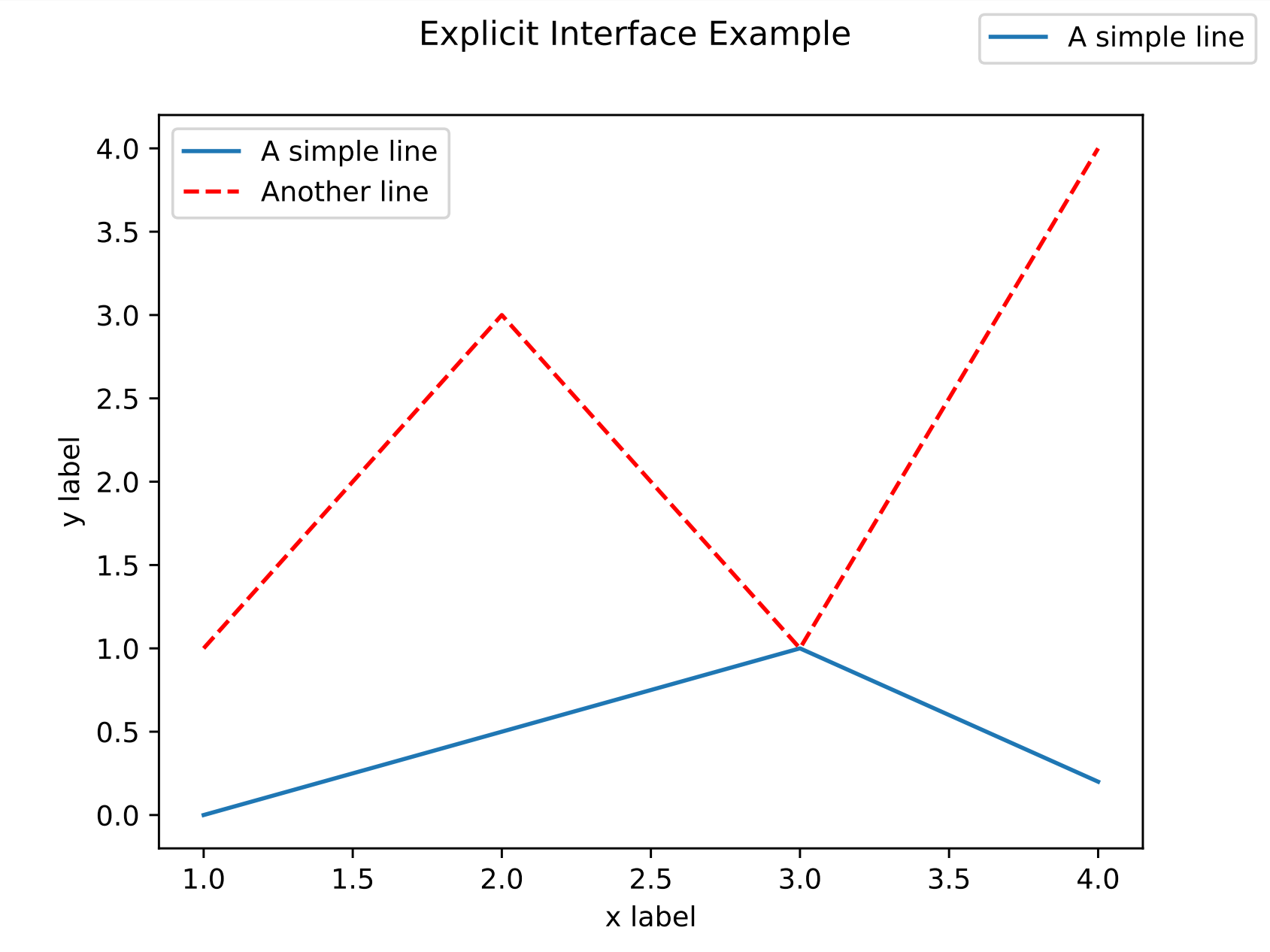
Matplotlib - Example



Matplotlib - Example

```
# Add another line and a second legend
ax.plot([1, 2, 3, 4], [1, 3, 1, 4], 'r--')
ax.legend(['A simple line', 'Another line'])
# And save the figure
fig.savefig("/workspaces/python_course/slides/week_five/figures/
    myplot.pdf")
```

Matplotlib - Example



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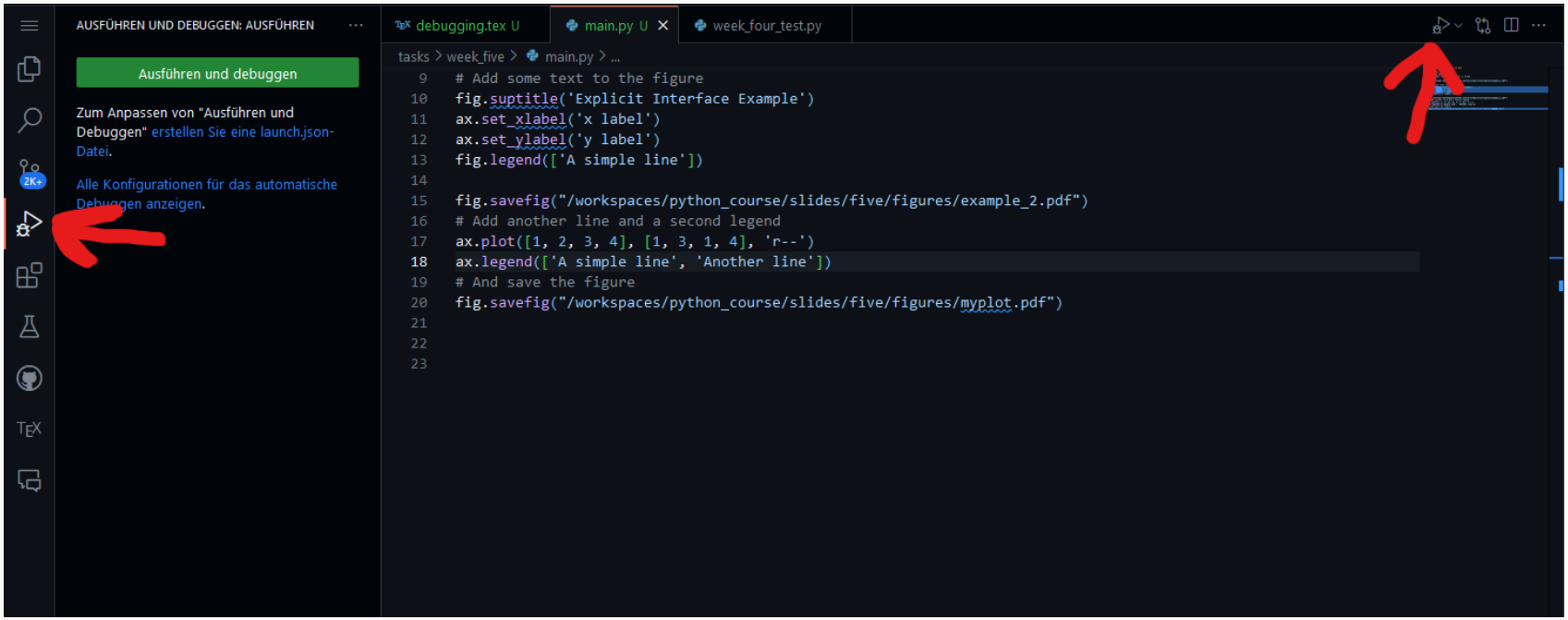
- Special program attached to the running program
- Allows you to inspect the program at runtime

Debugging

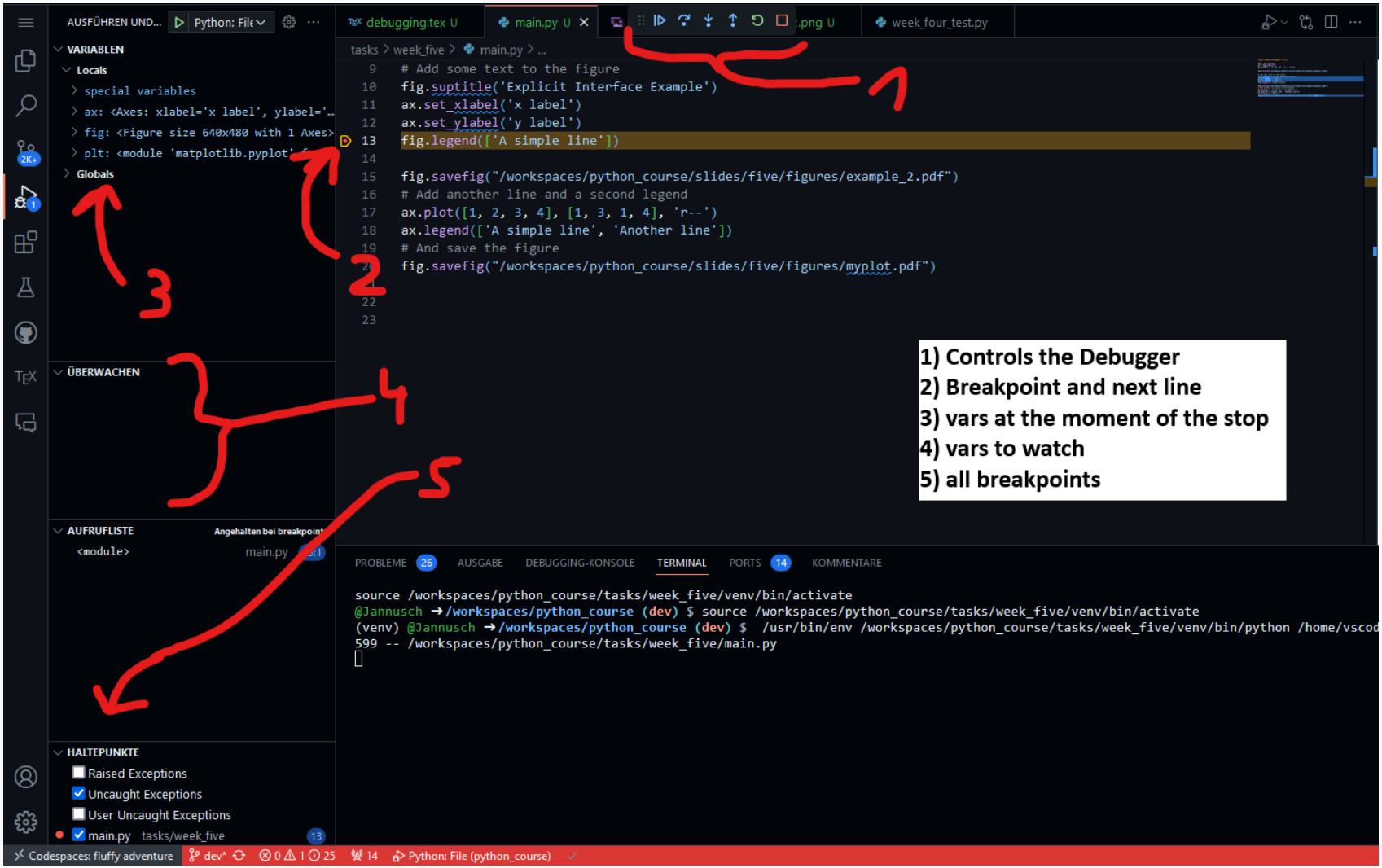
Usecases:

- cath errors and show you the code and the state of the code
- set breakpoints and hold the program at a certain point

Debugging - HowTo



Debugging - HowTo



Debugging - Example

Task

Task

- Advent of Code again (now with debugger)
- Try to plot some of the data

Task - Matplotlib

1. **Rebuilt the container**
2. **Create the environment**

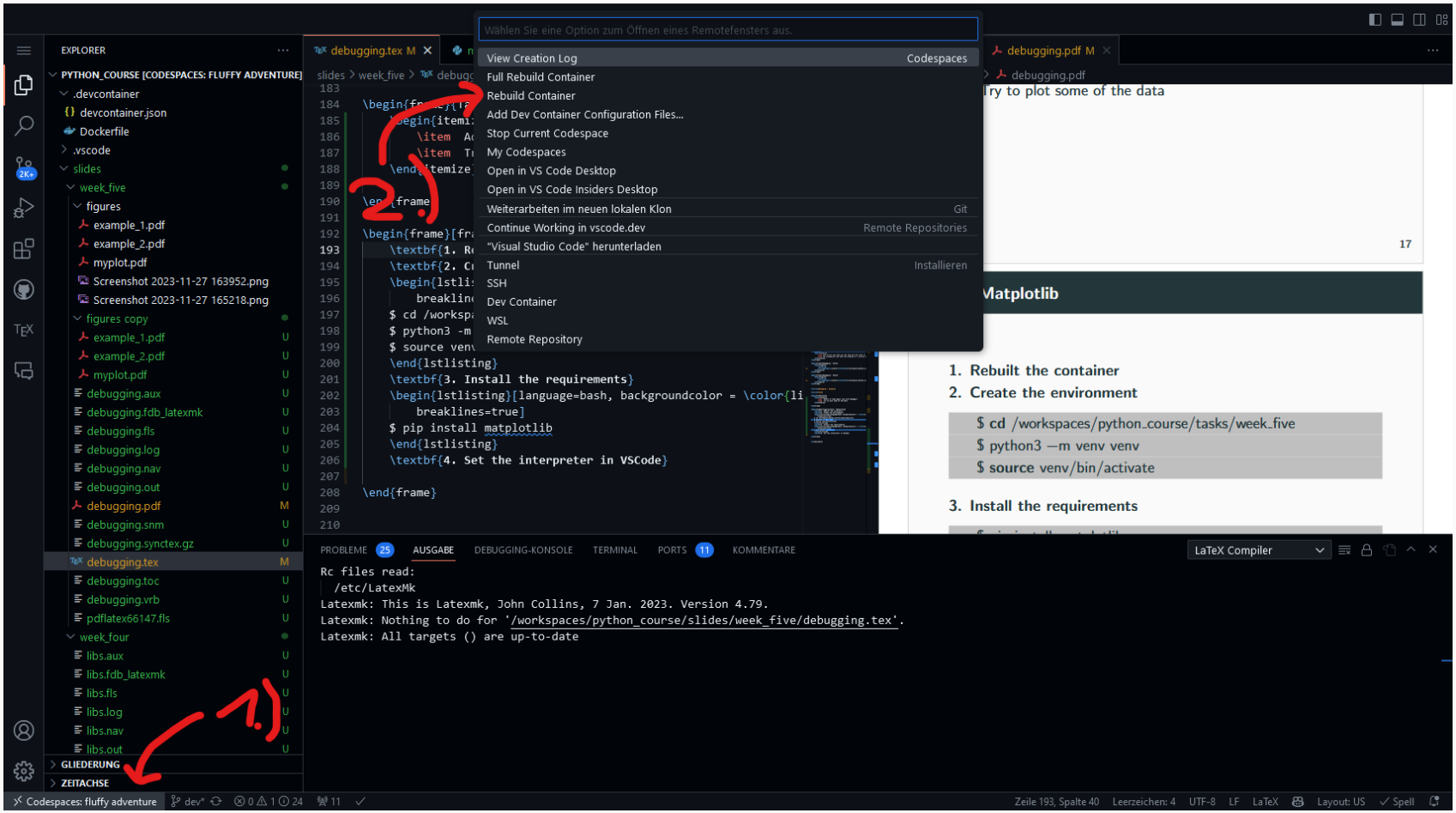
```
$ cd /workspaces/python_course/tasks/week_five
$ python3 -m venv venv
$ source venv/bin/activate
```

3. **Install the requirements**

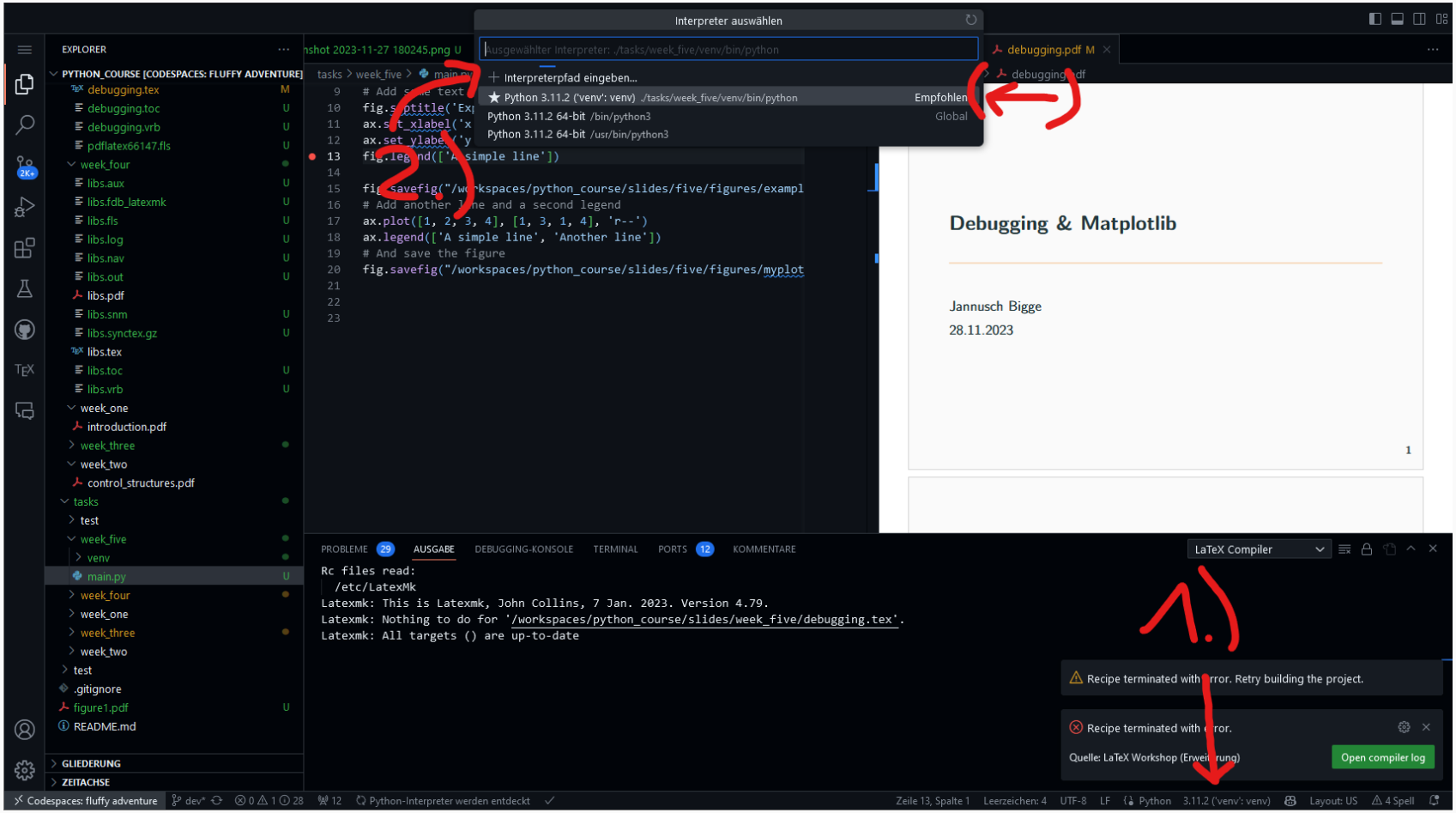
```
$ pip install matplotlib
```

4. **Set the interpreter in VSCode**

Task - Rebuilt the container



Task - Set the interpreter



Maybe you have to navigate no the path (venv/bin/python). Best case VSCode finds it automatically.