Topic 3 – Modules

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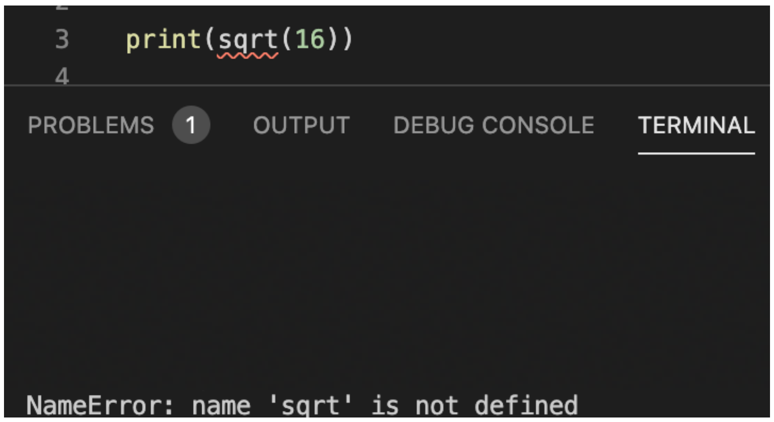
Table of Contents

Introduction

The vast array of modules available for Python help make it one of the most flexible coding languages. A module in Python is a collection of software designed to perform a specific purpose. Each module is essentially a .py file that is either built-in or external to Python's Standard Library. External modules can be downloaded from the Internet via git. This lesson will explore built-in and external Python modules.

Import

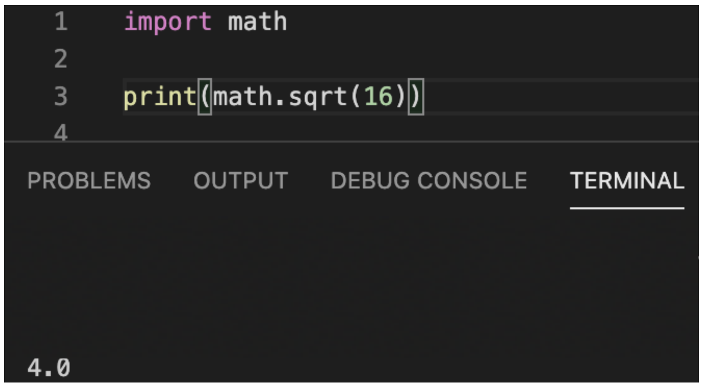
Let's say we want to use Python to find the square root of some integers. Python has a built-in module within the Python Standard Library that makes finding square roots easy! However, if we try to use the sqrt attribute to find the square root of 16, for example, we run into an error:



```
print(sqrt(16))
```

```
NameError: name 'sqrt' is not defined
```

The sqrt attribute is part of the math module. The math module is already part of Python's Standard Library when you download and install Python, but to keep Python lean and simple, it is not automatically loaded into Python's main process. To call the math module, we use an **import** statement:



```
import math

print(math.sqrt(16))
```

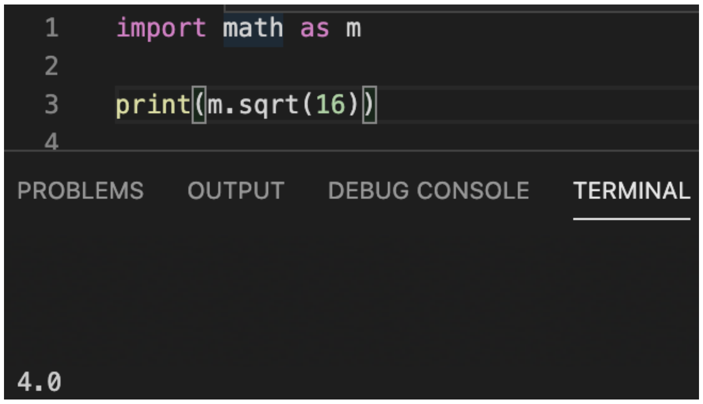
```
4.0
```

In the example above:

- We import the math module from Python's Standard Library

- It is common practice to define import statements at the top of your Python script. This way, modules are loaded as the script begins to run.
- To execute the square root attribute, we use math.sqrt in a print function.

We can also **import** a module **as** a name of our choosing:



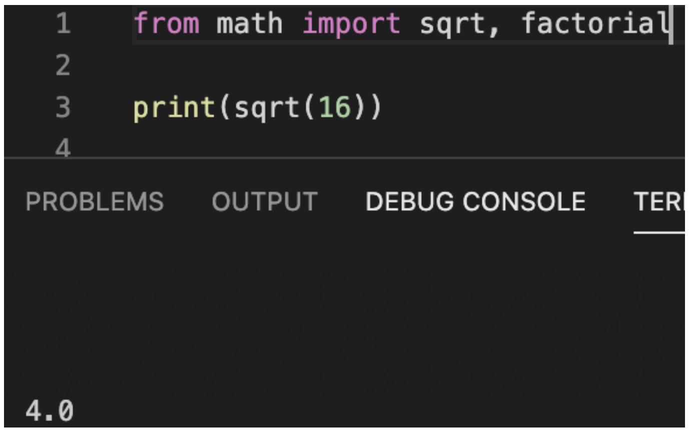
```python
import math as m

print(m.sqrt(16))
```

```
4.0
```

- As you can see, we **import** the math module **as** "m"
- We, therefore, call the sqrt attribute with m.sqrt instead of math.sqrt.

To avoid needing to call the module and the attribute every time we need to run the attribute, we can use a **from** statement with our **import** statement to import select/all attributes from a module.



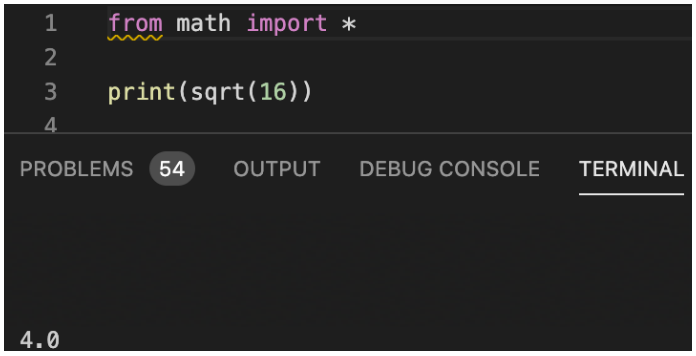
```python
from math import sqrt, factorial

print(sqrt(16))
```

```
4.0
```

In the example above:
- We use the **from** and **import** statements to **import** the sqrt and factorial attributes **from** the math module
- As a result, in our print function, we simply call sqrt instead of math.sqrt

We can also use an asterisk to **import** all attributes **from** a module, which still allows us to use attributes without defining the module name:



```
from math import *

print(sqrt(16))
```

PROBLEMS 54   OUTPUT   DEBUG CONSOLE   TERMINAL

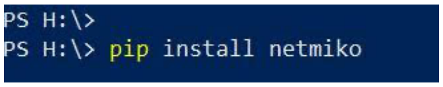
```
4.0
```

In the example above:

- We still only need to call sqrt instead of math.sqrt to run the sqrt attribute.

External Modules

Python has a vast community of developers, some of which have developed special modules outside of the Python Standard Library. To install external modules, use pip. Installed with Python, pip is a package manager for Python that efficiently reaches out to PyPI (Python Package Index) to download packages. A package is simply all the files you need to run a module.

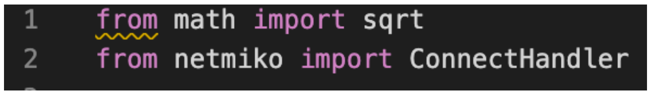


```
PS H:\>
PS H:\> pip install netmiko
```

In the example above:

- We use PowerShell with elevated privileges to install the netmiko module, which is hosted on PyPI
- Note: if you are installing external modules on your company-owned machine, please be aware of any audit or governance restrictions for Python modules

After executing the pip command in PowerShell, we are now able to **import** netmiko! Specifically, we will **import** the attribute ConnectHandler **from** netmiko to prepare for our next lesson.



```
from math import sqrt
from netmiko import ConnectHandler
```

Conclusion

Modules add additional functionality to any Python script. Importing them into a script is a matter or ascertaining if the module is built-in or external, and if it's external, using pip to install it. The **from** and **import** statements—which should be defined at the top of your script—add the module's functionality to your script. Check out the accompanying **Lesson4-modules.py** file for some practice!

Below is a list of continued reading for modules:

- Python Standard Library for 3.8
- PyPI
- Pip
- Modules