Programming fundamentals with Python

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https://slides.com/pepegar/pfp-10/live

Plan for today

Learn what are modules and why they exist

Learn about standard library modules

Learn about third party modules

Create our own modules

Modules

Python modules allow us to reuse code written somewhere else

Modules

We, as programmers need to be lazy, and follow the DRY principles. That's what modules help with.

Modules

To use modules, we need the import statement:

```
import module
```

Modules

When we import a module, all variables in the module are evaluated, all functions created, and top level statements executed.

Modules

Modules

But, where does Python search for modules?

sys.path

Standard library

The stdlib is a set of modules for a lot of different purposes

Python follows a batteries included approach, trying to give us as programmers everything we need

Standard library

We have already used some modules from the standard library before:

sys

sys contains functionality related with the current python session

```
import sys

print(sys.path)

# ['', '/Library/Developer/CommandLineTools/Library/Frameworks/Python3.frame
```

time

time module from the standard library contains utilities related to **time**

```
import time

while True:
    time.sleep(1)
    print("hello!")
```

math

math module contains useful functions and constants for doing numeric and mathematic operations

```
import math

math.ceil(3.4)
# 4



math.floor(3.4)
# 3
```

third party libraries

There are a lot of third party libraries:

https://pypi.org

example: matplotlib

matplotlib is a great library for plotting and visualizing data

This library does not usually come installed with python, but we have it because we installed anaconda!

matplotlib

Recap

Import modules with import

Create our own modules as files

stdlib contains a lot of useful stuff

third party libs can help when something is not on stdlib

Exercises

Exercise 1

create a more accurate version of **calculate_volume_cilinder** and **calculate_volume_sphere** that gets the **pi** constant from the **math** module

Exercise 2

Investigate how to create histograms using the **matplotlib** library. Create a function that uses the **matplotlib** library to plot the histogram of the grade distribution in an imaginary IE class with 100 students. Remember that there are 15% pass, 35% proficiency, 35% excellence, and 15% honors in a class.

Exercise 3

Investigate about packages in Python, read this guide https://docs.python.org/3/tutorial/modules.html#packages.

Create the following packages:

- a **utils** package, containing a **functions** module. The **functions** module should contain a function **area_triangle** that calculates the area of a triangle.
- a **data** package, containing a **triangles** module that declares a variable **triangle_definitions** with a list of 10 triangle definitions. Each triangle definition should be a dictionary like:

{"base": 10, "height":2}

- a **main.py** file that will use **utils.functions.area_triangle** and **data.triangles.triangle_definitions** to print the areas of all triangles