

BIM A+

European Master in  
Building Information Modelling

# Introduction to Python programming language

Topic 2: Fundamentals of programming

BIM A+3: Parametric Modelling in BIM

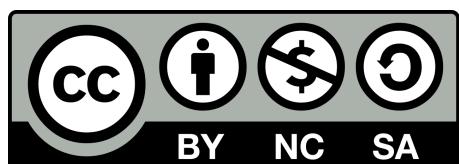
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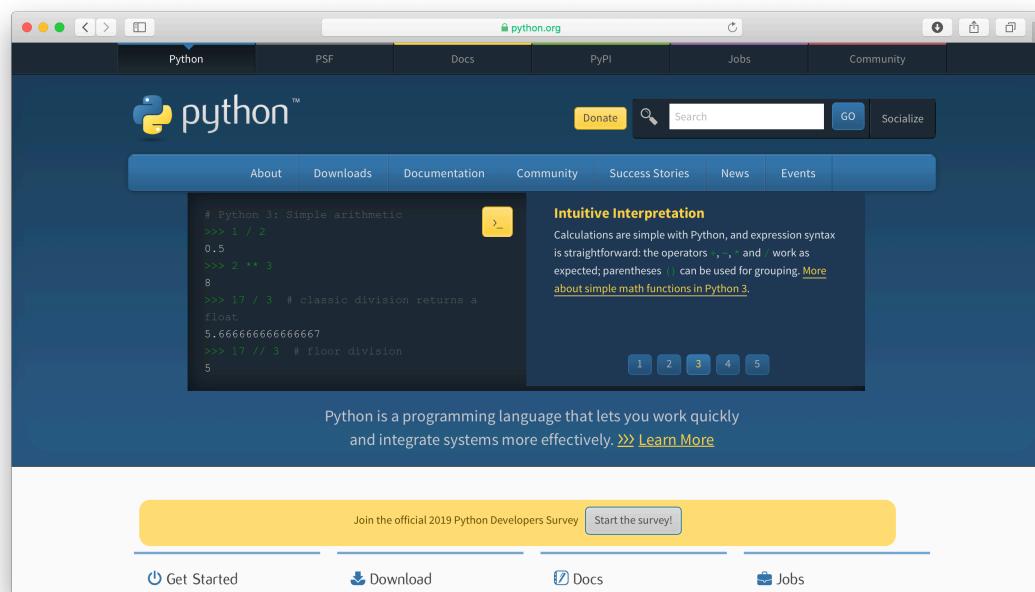
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# Compiled vs Scripting languages

- Compiled
  - A program is executed (i.e. the source is first compiled, and the result of that compilation is expected)
  - A "program" in general, is a sequence of instructions written so that a computer can perform certain task.
  - Examples: C/C++, Fortran, Objective-C, Swift, ...
- Scripting
  - A script is interpreted
  - A "script" is code written in a scripting language. A scripting language is nothing but a type of programming language in which we can write code to control another software application.
  - Examples: Python, Ruby, Perl, ...

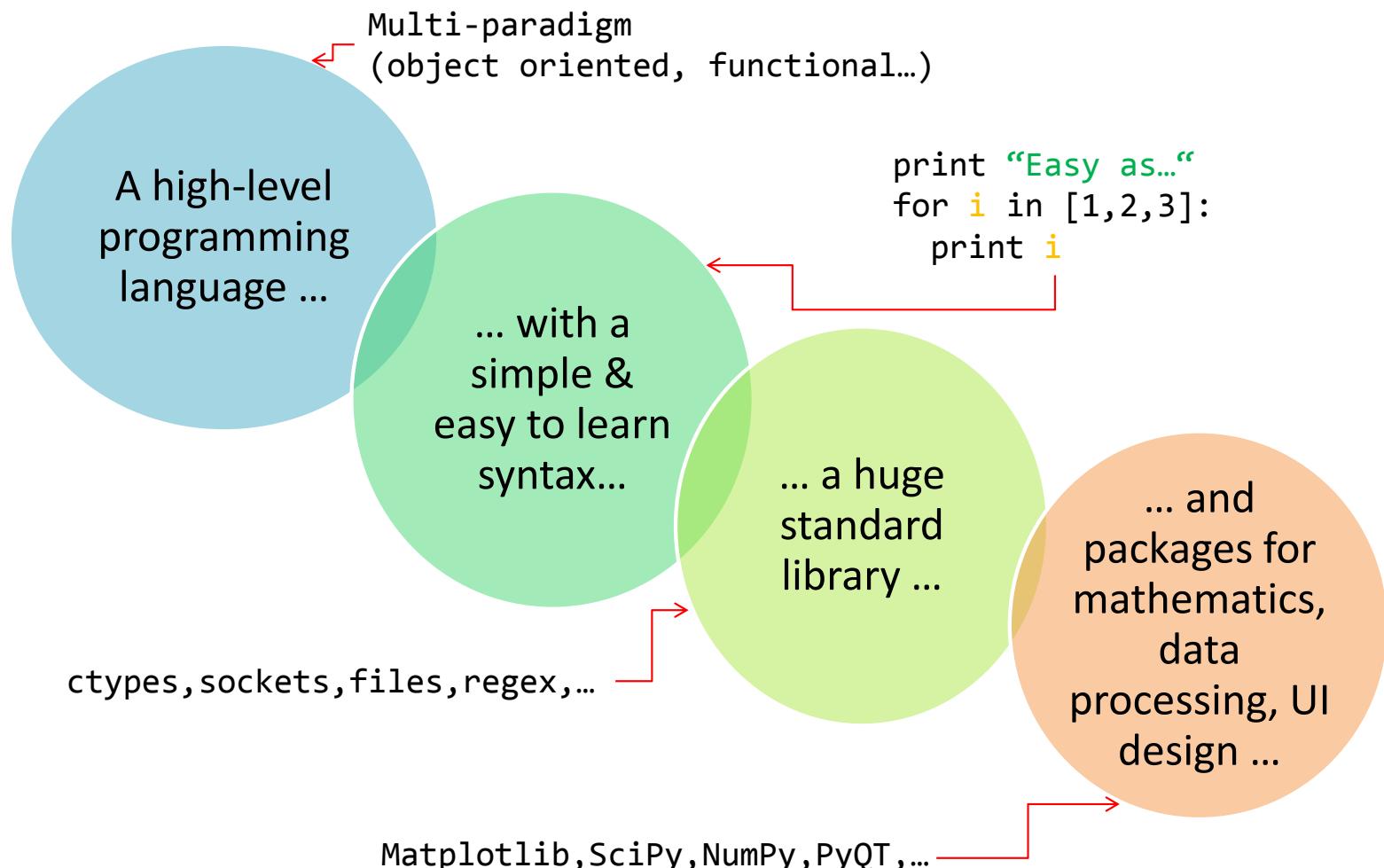
# What is Python?

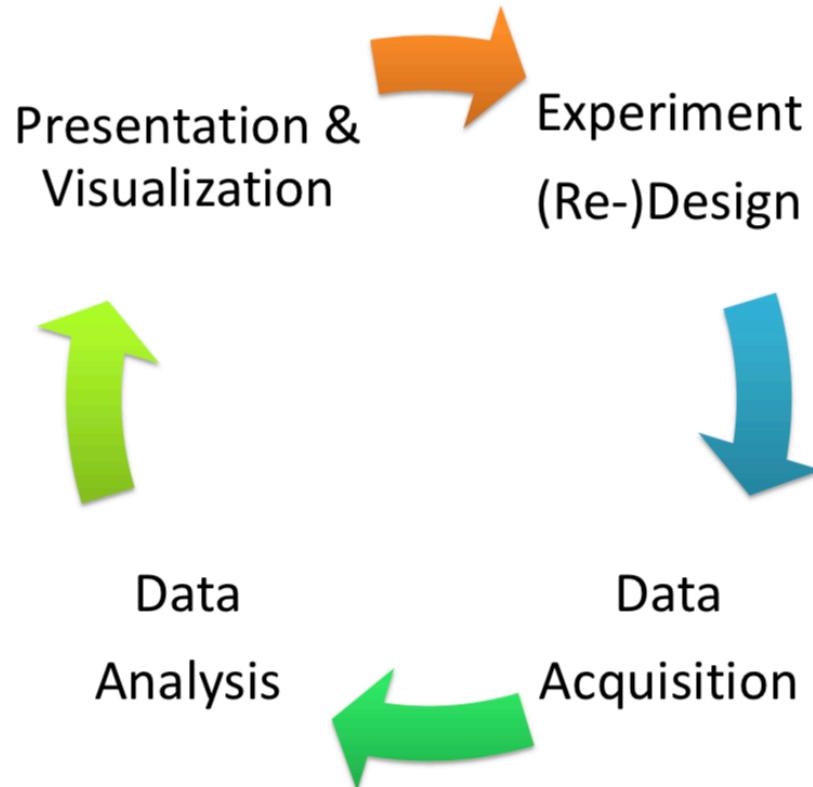
- Python is a general purpose programming language that is often applied in scripting roles.
  - So, Python is programming language as well as scripting language.
  - Python is also called as Interpreted language
- Differences between program and scripting language.
  - A program is executed (i.e. the source is first compiled, and the result of that compilation is expected)
  - A "program" in general, is a sequence of instructions written so that a computer can perform certain task.



# Why Python?

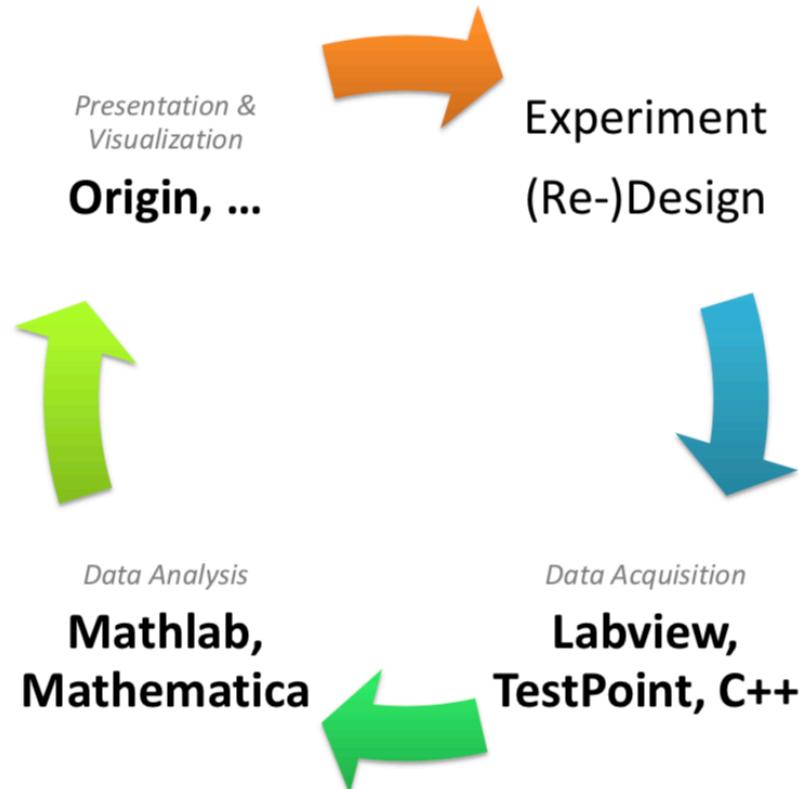
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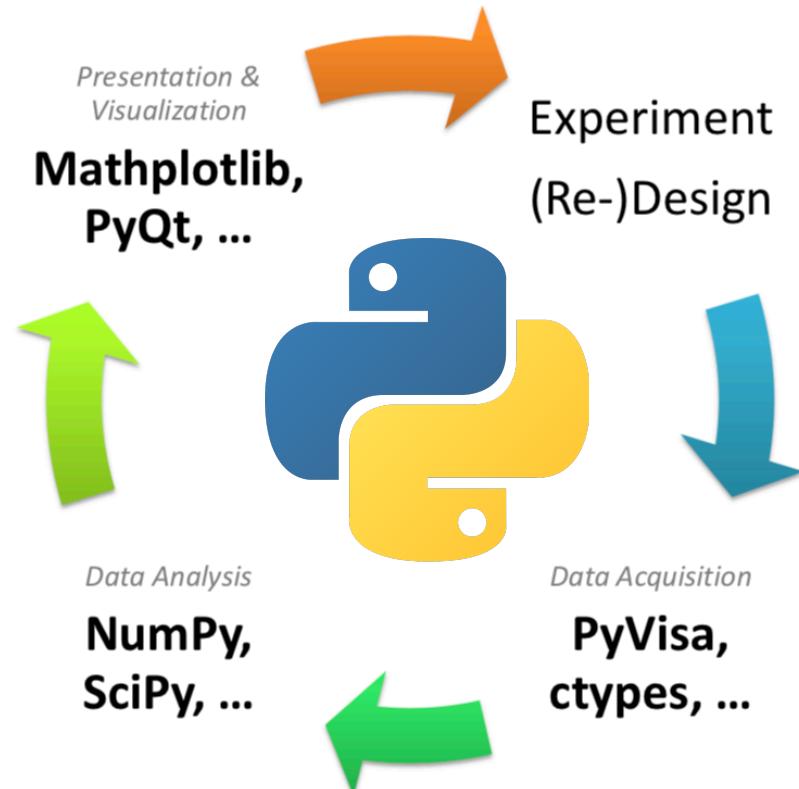




# Scientific/Engineering workflow using software

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# BIM and Python

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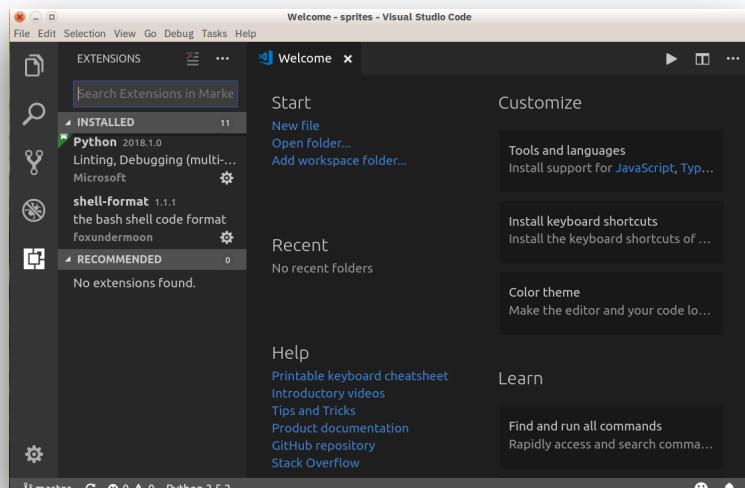
The collage consists of four main images:

- Top Left:** A screenshot of a CAD software interface showing a 3D model of a structural component and its corresponding 2D cross-sections.
- Top Right:** A screenshot of the pythonOCC website, which is a 3D CAD library for Python. It shows examples of 3D models and deformation analysis.
- Bottom Left:** A screenshot of the ArchiCAD Graphisoft Python Add-On interface. It shows a 3D view of a building model, a Python script editor with code for creating beams, and a graphical interface for defining input parameters.
- Bottom Right:** A screenshot of the PHISOC Python Add-On for ARCHICAD23. It shows a 3D view of a building model and a Python script editor with code for creating curves and points.

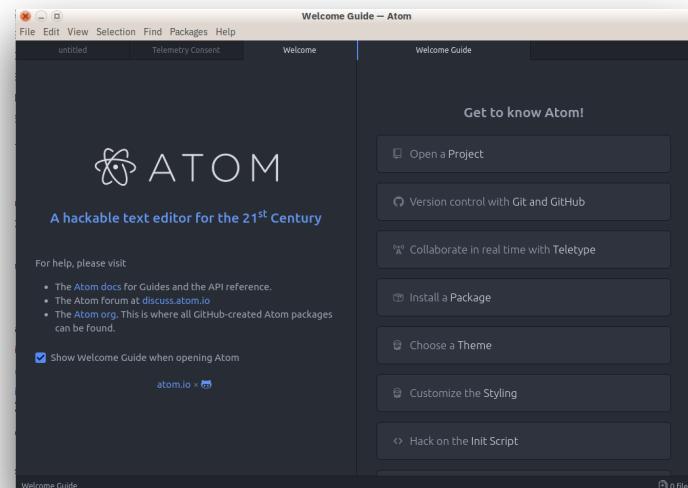
# How to get started?

- Download and install
  - Official distribution: <https://www.python.org>
  - Anaconda (Science friendly distribution): <https://www.anaconda.com>
- Documentation
  - Python has one of the best documentation
  - Official documentation: <https://www.python.org/doc/>
- Additional resources
  - Learning Data Science: Our Favourite Python Resources:  
<https://hackernoon.com/learning-data-science-our-favorite-python-resources-from-free-to-not-877fca5c92f0>
  - Talk Python to Me: <https://talkpython.fm/home>

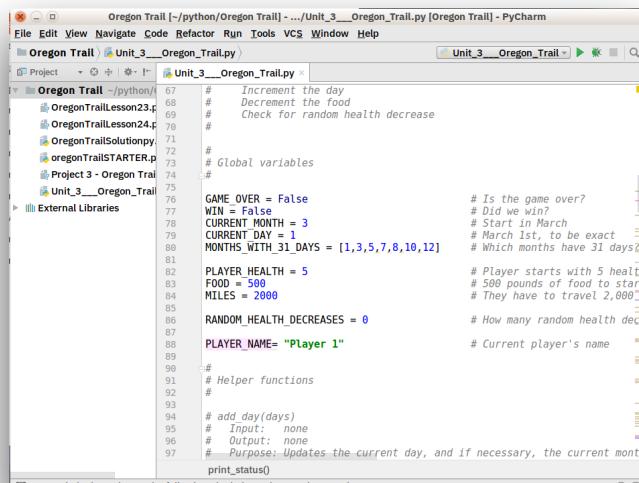
# Python editors



<https://code.visualstudio.com>



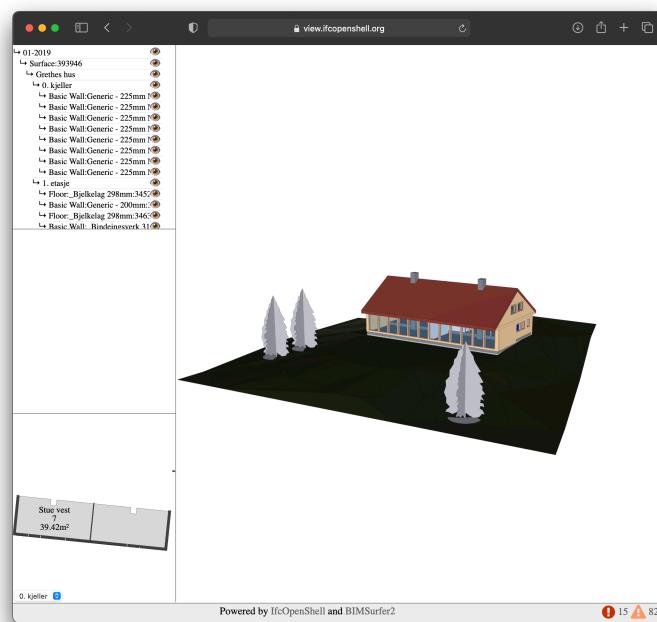
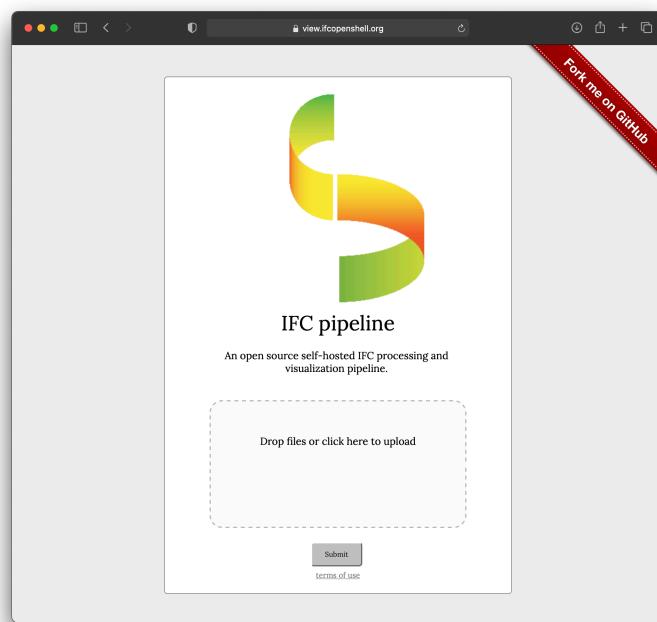
<https://atom.io>



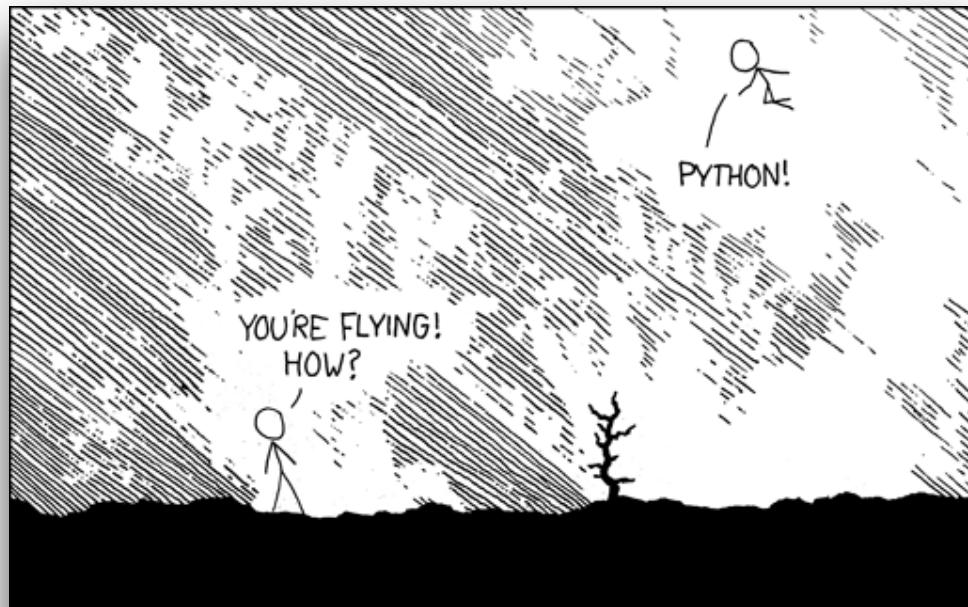
<https://www.jetbrains.com/pycharm/>

# Python and IFC

- Download and install IfcOpenShell-Python
  - <http://ifcopenshell.org>
- Read articles about IfcOpenShell
  - <http://academy.ifcopenshell.org>
- Try IFC pipeline (but do not stress the service!)
  - <https://view.ifcopenshell.org>



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I LEARNED IT LAST NIGHT! EVERYTHING IS SO SIMPLE!  
/ HELLO WORLD IS JUST  
print "Hello, world!"

I DUNNO...  
DYNAMIC TYPING?  
WHITESPACE?  
/ COME JOIN US!  
PROGRAMMING IS FUN AGAIN!  
IT'S A WHOLE NEW WORLD UP HERE!  
BUT HOW ARE YOU FLYING?

I JUST TYPED  
import antigravity  
THAT'S IT? /  
... I ALSO SAMPLED  
EVERYTHING IN THE  
MEDICINE CABINET  
FOR COMPARISON.  
/ BUT I THINK THIS  
IS THE PYTHON.