Python

The last language you need to learn.

Python vs JavaScript

- Python is a **scripting** language, similar to JavaScript
- Difference
  - JavaScript is for **interface development**
    - Front-end development language, web browsers
  - Python is used for **everything**. Including web dev
    - **Universal**, operates **independently** of a webpage or server
    - Can be used for
      - Front end OR back end
      - Simulations and analysis
      - Scripting and visuals
      - Basically anything

What's the deal?

- Compared to other languages, Python is **easy** to **code** and **read**

Java

```
public static void main(String[] args) {
    system.out.println("Hello, world!");
}
```

vs

Python

```
print("Hello, world!")
```

- Python works as a **scripting** language (similar to Javascript)
  - It runs commands from the top down - NOT event driven
- Python works as **object-oriented** language (similar to Java, C++)
  - "Main", and class definitions are not required, but available
- Python is an **interpreted** language (unlike Java, C++)
  - With an interpreter, the program can be run
    - Invariant of OS, computer architecture

Syntax

Simple! Nesting is based on **whitespace** (Tabs or spaces. Don't mix them!)

variables and assignments - types are automatic

```
a = 1
b = "Hello!"
```

if statements

```
if greeting:
    print("Hello, world!")
elif goodbye:
    print("Goodbye, world!")
else:
    print("I don't know what to say, world!")
```

functions

```
def my_dumb_function():
    value = get_me_value()
    return value
```

classes

```
class animal(object):
    def cry():
        print("waa","tears")
    def be_born()
        self.age = 0
        self.cry()
    def __init__(self):
        self.be_born()
```

for loops

```
for item in list:
    do_action(item)
```

Core data types and structures

- Int: 0, 5, -10
- Float: 1.3, 1e6, NaN
- String: “Go Cougars”
- Character: ‘H’, ‘W’
- Boolean: True, False
- Lists: [‘H’, ‘e’, ‘r’, ‘r’, ‘ ‘, ‘W’, ‘e’, ‘r’, ‘t’]
  - Zero indexed array
- Dictionaries: {“Herr” : “Wert”, “Jordan” : “Kemp”, “Steven” : “Stetzler”}
  - Hash table

Packages. So many open source packages

importing packages

```
import package_name          import numpy as np
package_name.function()      np.random.uniform()
```

Package Type	Purpose
Numpy	Math tools: math operation on arrays , math oriented types
OpenCV	Computer Vision
AstroPy	Astronomy data analysis
Pandas	Data analysis and visualization
Cython	C in Python (massive speed boosts)
Sklearn	Machine Learning
Tensor Flow	Neural Networks

Your own!!

Installing Packages

pip

`pip install package_name`

(for you): `pip install --user package_name`

`python -m pip install package_name`

(for you): `python -m pip install --user package_name`

Anaconda

- An easy to use package and environment manager. Comes with many important packages pre-installed

`conda install package_name`

`**user tag is important for KHS computers`

Demos

Today

- Steven - Moby Dick text analysis
- Jordan - Pulling in data from Excel
- Jordan - Senior thesis simulation

Tomorrow

Neural networks with Python