NOAC 2024

CU Boulder

SEEK NEW HEIGHTS

Code Crafting Essentials

Using Python for Success

Mason Pryor • mason.pryor@shawneelodge.org

Meet Your Trainer

- Shawnee Lodge #51
- O'Fallon, MO

Mason Pryor

MISSOURI S&T

Learning Objectives

1. Learn the basics of Python
   a. Data types and variables
   b. Basic operators and functions
   c. Input & output
   d. Using a dataframe and JSON files
2. Understand the resources available to teams in creating their Hackathon solutions

1.
Getting Started

IDEs, Google Colab, Replit

Integrated Development Environment

- Also known as an IDE
- Contains various development tools:
  - Text Editor
  - Compiler
  - Debugger
  - Terminal
  - Version control
- Online IDEs
  - replit.com, Google Colab

Google Colab

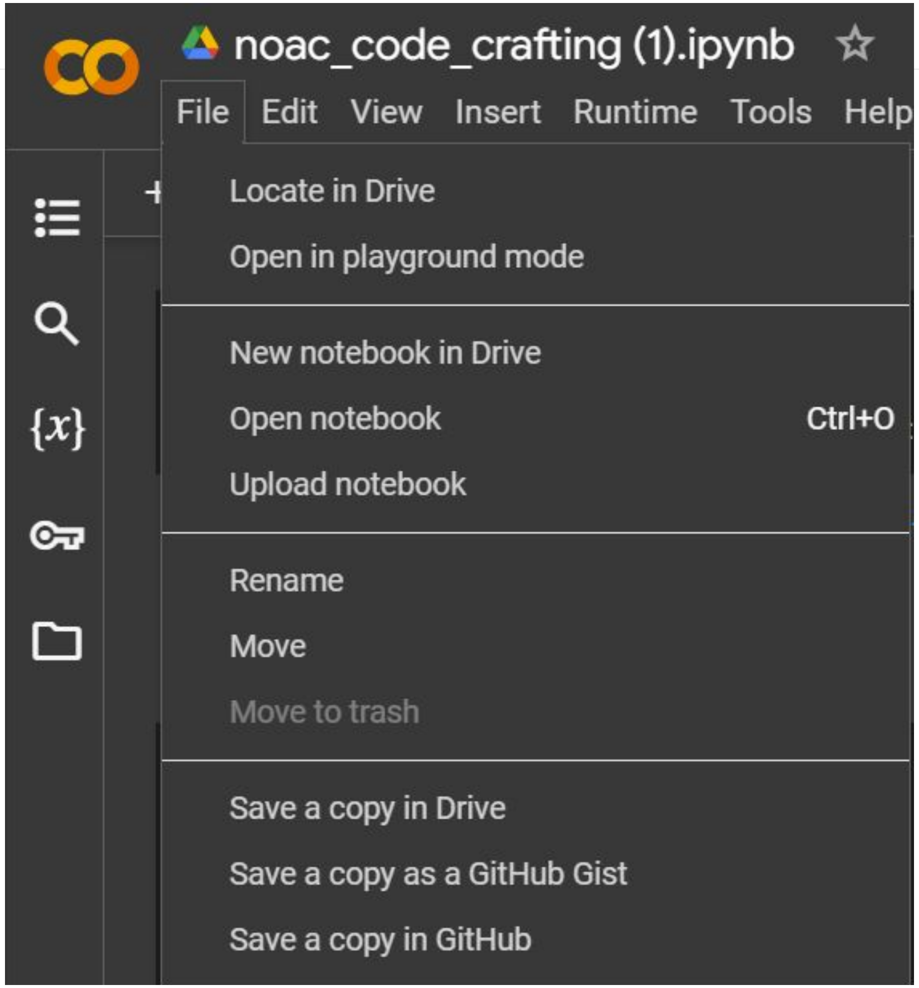
- Hosts Jupyter Notebooks

- **Project Jupyter**
- Non-profit, Open Source
- Interactive Data Science and Scientific Computing

https://jupyter.org/about

Copy Sample Code

1. Open Google Colab
2. Open our sample code
3. Save a copy in Drive



https://tinyurl.com/OAHackCode

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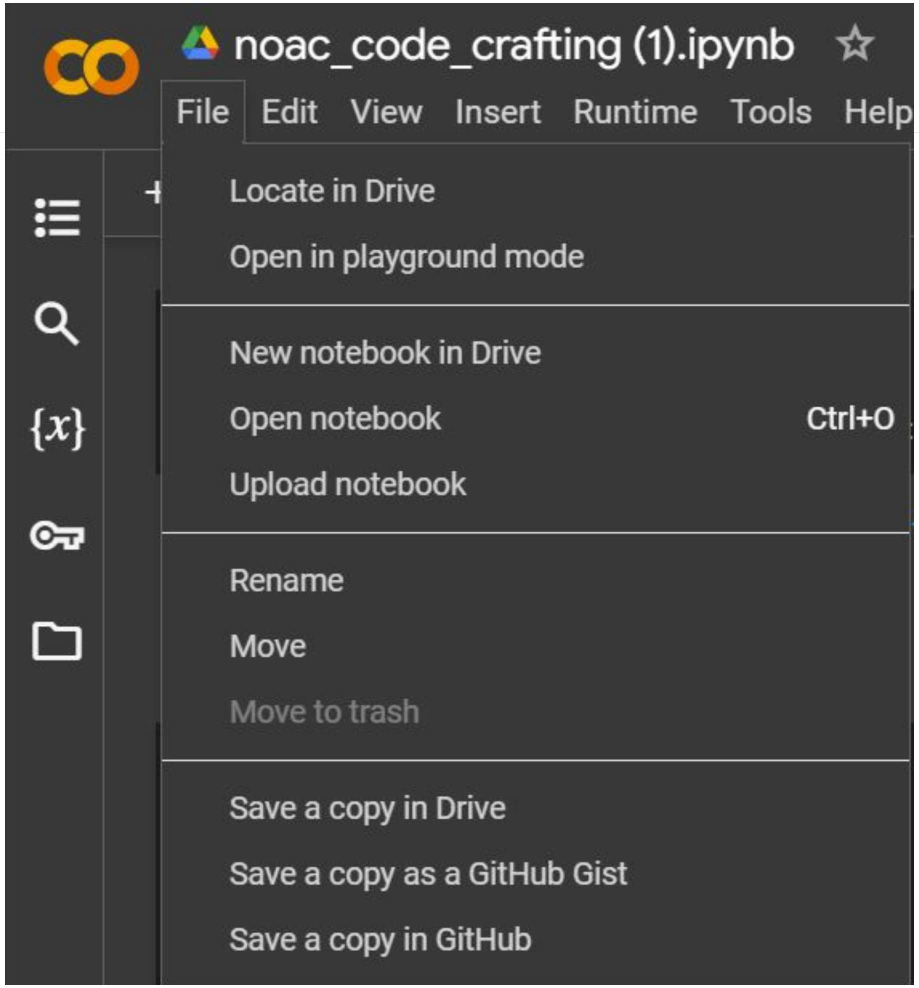
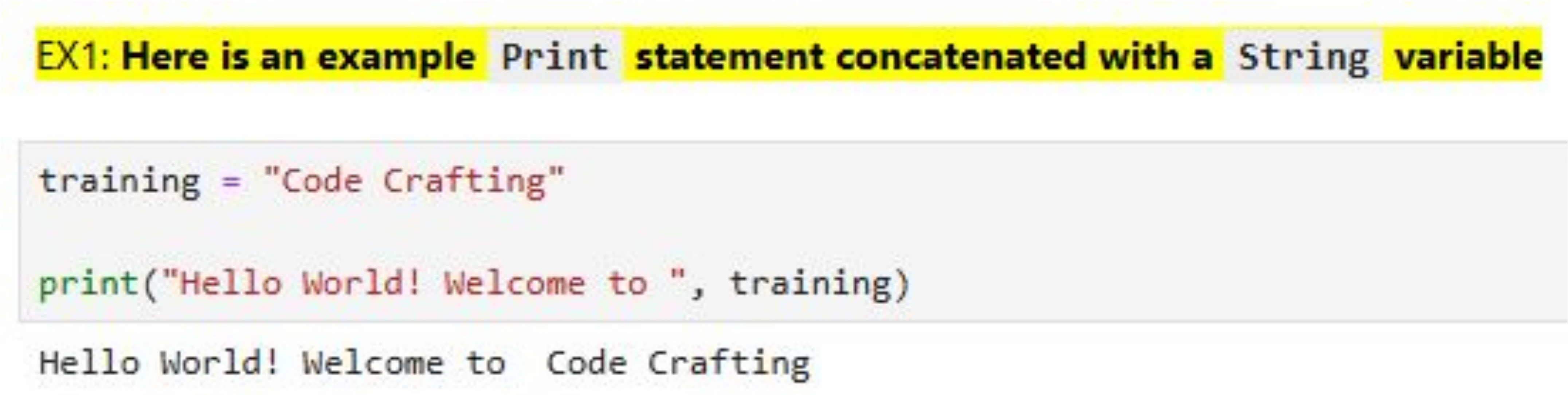


https://drive.google.com/drive/folders/1j5aaM427v8nz3sHn3vYIv_v2KeaC6FTn?usp=drive_link

2.
The Basics

Syntax, Data Types, Operators, I/O, etc.

Sample Print Statement



EX1: Here is an example `Print` statement concatenated with a `String` variable

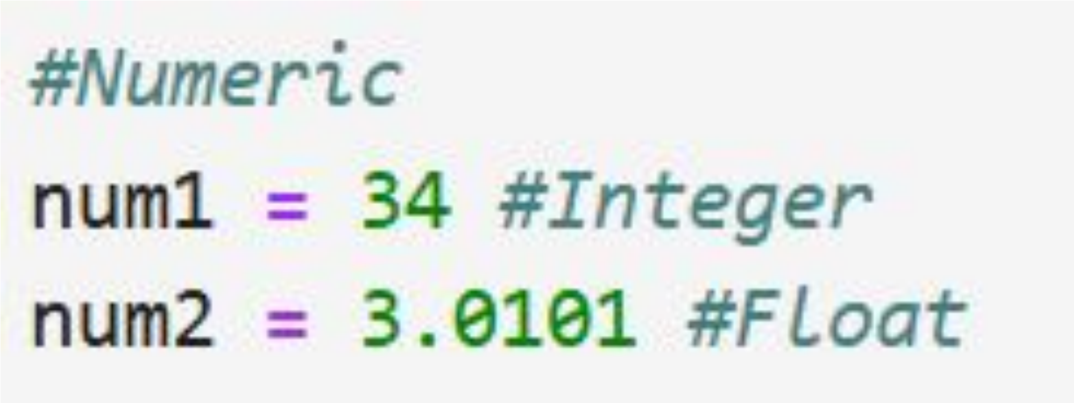
```
training = "Code Crafting"

print("Hello World! Welcome to ", training)
```

```
Hello World! Welcome to  Code Crafting
```

Data Types

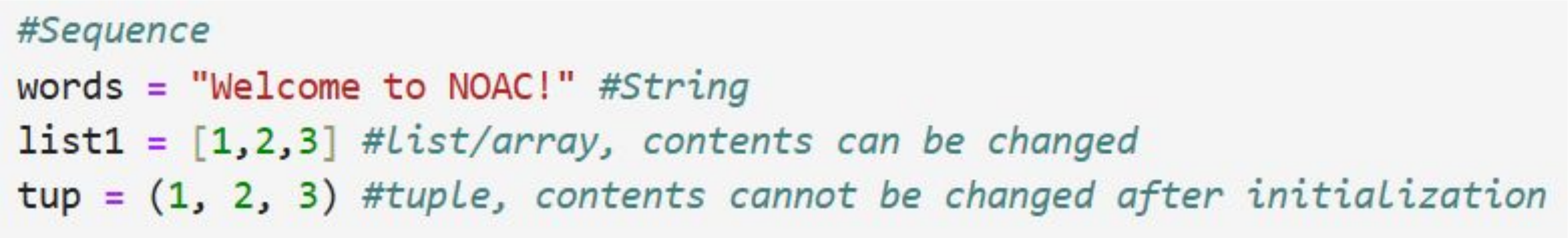
Numeric
- Integer
- Float



```
#Numeric
num1 = 34 #Integer
num2 = 3.0101 #Float
```

Data Types

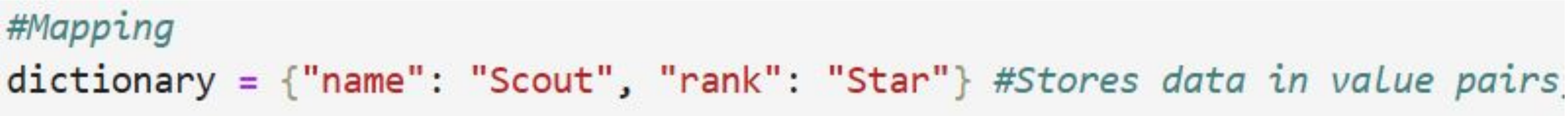
- Sequence
  - String
  - List
  - Tuple



```
#Sequence
words = "Welcome to NOAC!" #String
list1 = [1,2,3] #list/array, contents can be changed
tup = (1, 2, 3) #tuple, contents cannot be changed after initialization
```

Data Types

- Mapping
  - Dictionary

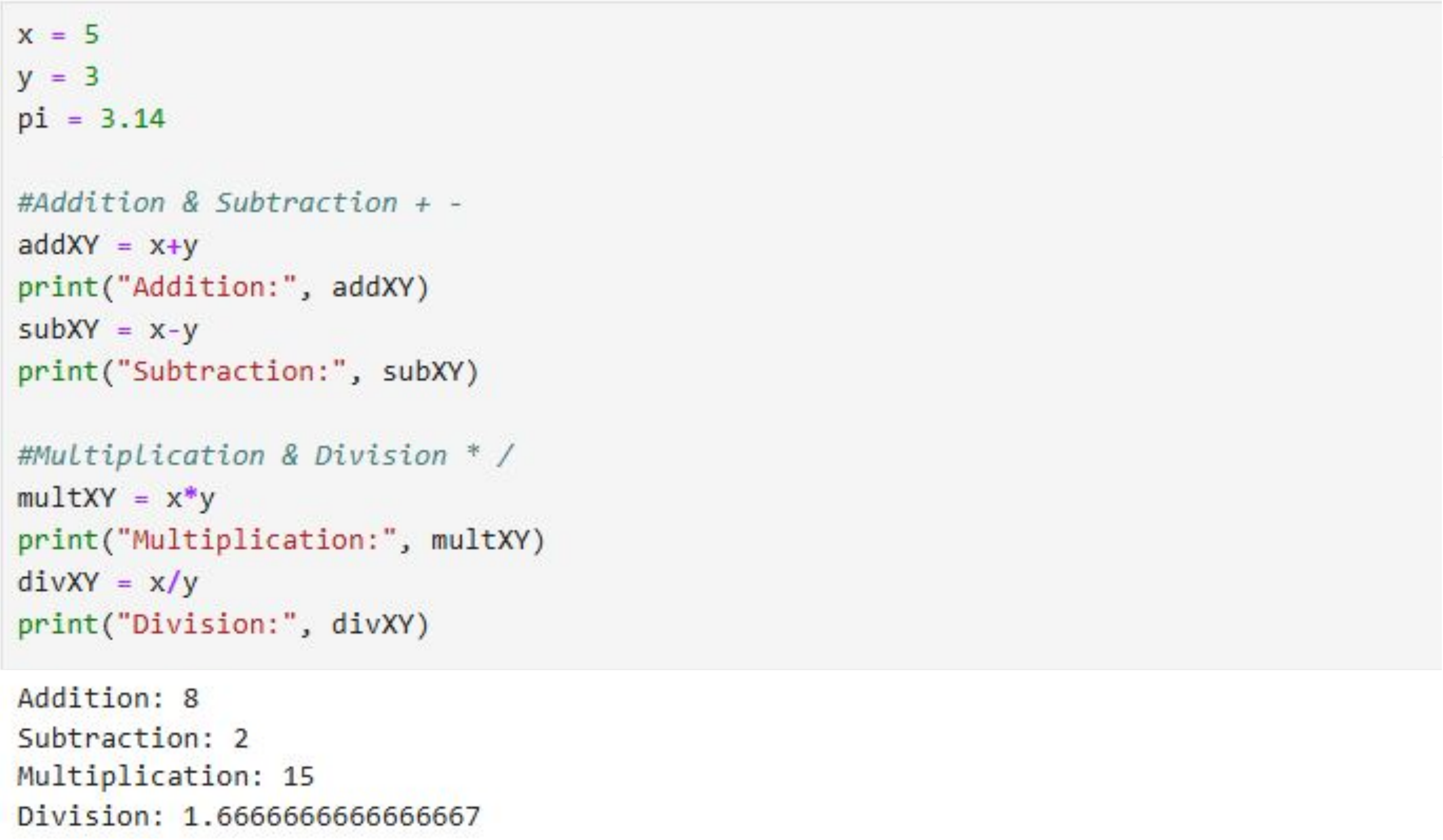


```
#Mapping
dictionary = {"name": "Scout", "rank": "Star"} #Stores data in value pairs
```

Calculations & Operators

Addition +
Subtraction -
Multiplication *
Division /
Exponent **
Modulus (remainder) %
Floor Division //

You can use multiple numeric data types in an equation

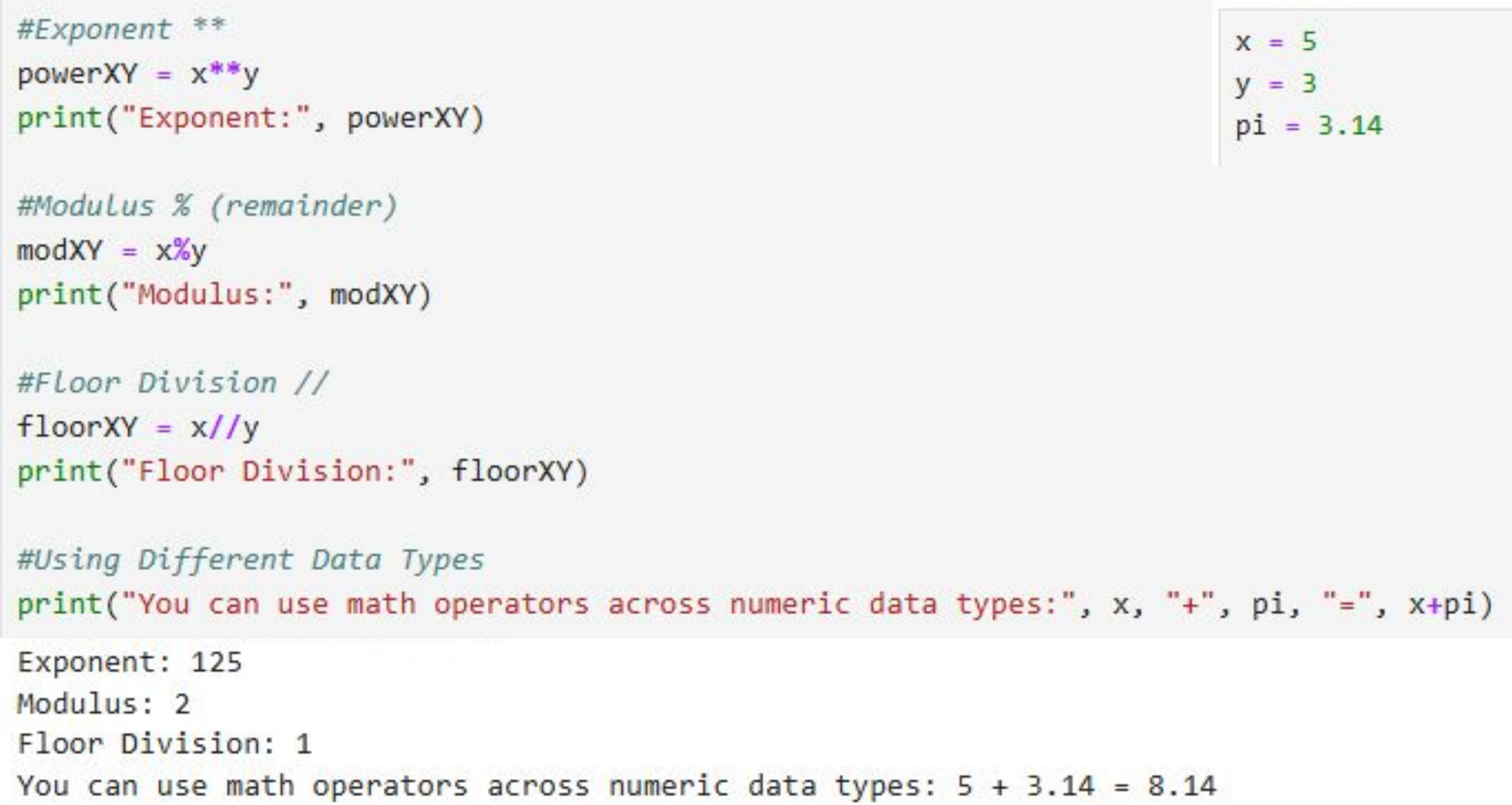


```python
x = 5
y = 3
pi = 3.14

#Addition & Subtraction + -
addXY = x+y
print("Addition:", addXY)
subXY = x-y
print("Subtraction:", subXY)

#Multiplication & Division * /
multXY = x*y
print("Multiplication:", multXY)
divXY = x/y
print("Division:", divXY)
```

```
Addition: 8
Subtraction: 2
Multiplication: 15
Division: 1.6666666666666667
```



```python
x = 5
y = 3
pi = 3.14
```

```python
#Exponent **
powerXY = x**y
print("Exponent:", powerXY)

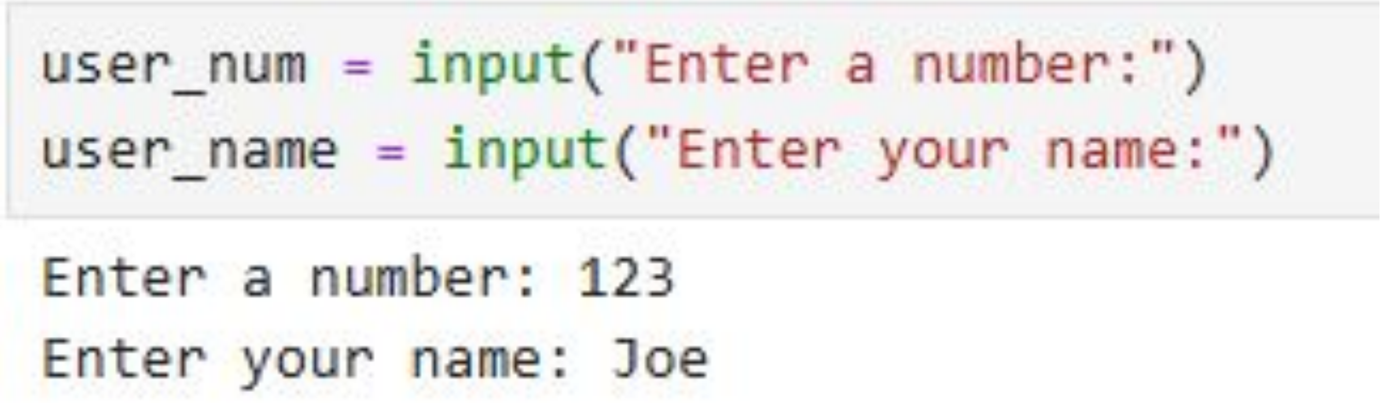
#Modulus % (remainder)
modXY = x%y
print("Modulus:", modXY)

#Floor Division //
floorXY = x//y
print("Floor Division:", floorXY)

#Using Different Data Types
print("You can use math operators across numeric data types:", x, "+", pi, "=", x+pi)
```

```
Exponent: 125
Modulus: 2
Floor Division: 1
You can use math operators across numeric data types: 5 + 3.14 = 8.14
```

User Input



```
user_num = input("Enter a number:")
user_name = input("Enter your name:")
```

```
Enter a number: 123
Enter your name: Joe
```

Conditionals & Code Blocks

== equal to

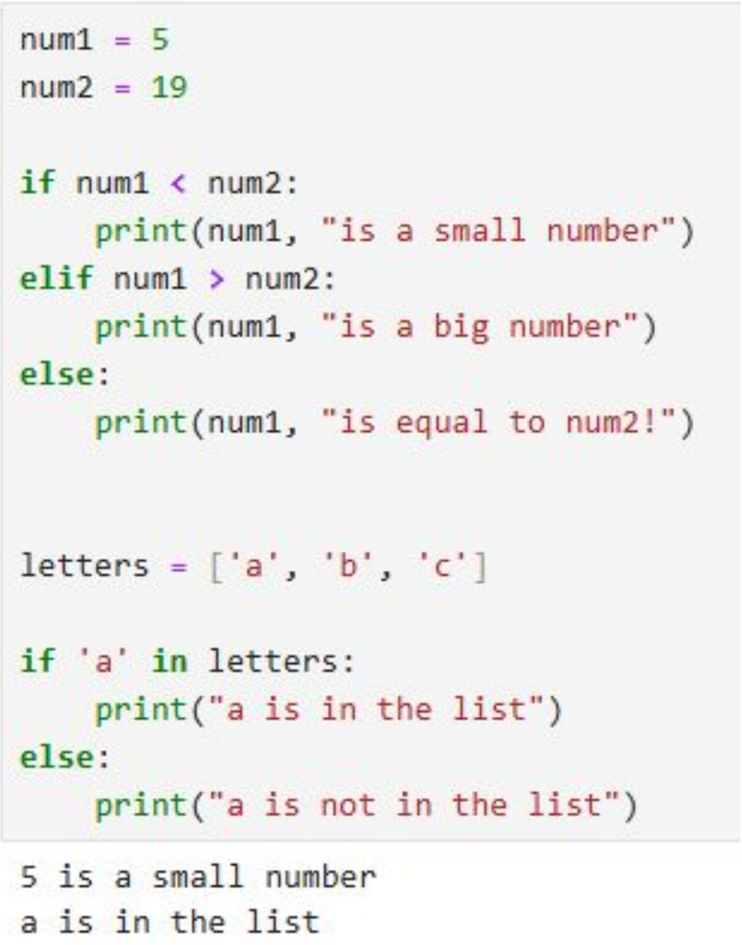
!= not equal to

< less than

<= less than or equal to

> greater than

>= greater than or equal to



```
num1 = 5
num2 = 19

if num1 < num2:
    print(num1, "is a small number")
elif num1 > num2:
    print(num1, "is a big number")
else:
    print(num1, "is equal to num2!")


letters = ['a', 'b', 'c']

if 'a' in letters:
    print("a is in the list")
else:
    print("a is not in the list")
```

```
5 is a small number
a is in the list
```

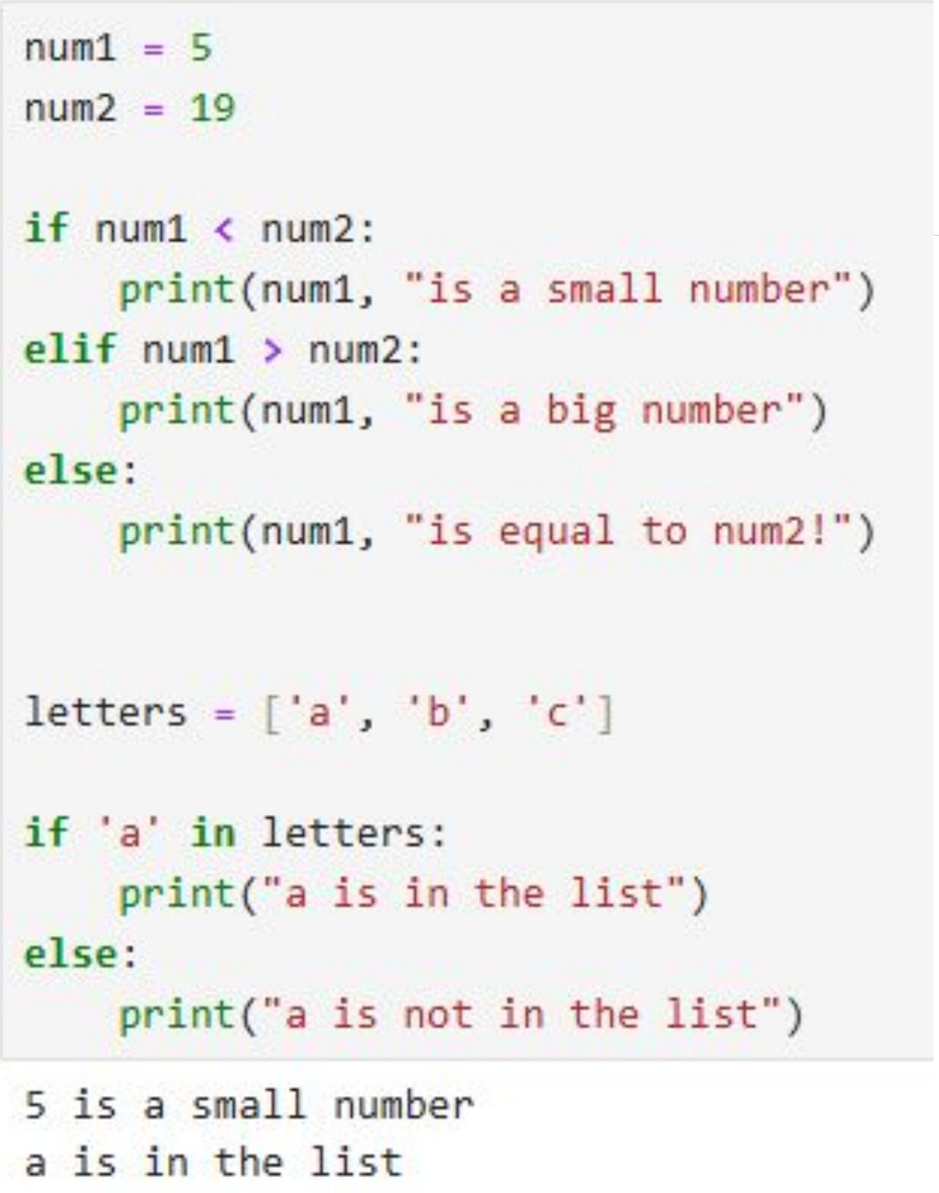
Conditionals

is tests if two objects are the same

is not tests if two values are not the same object

in tests if a value is in a sequence

not in tests if a value is not in a sequence



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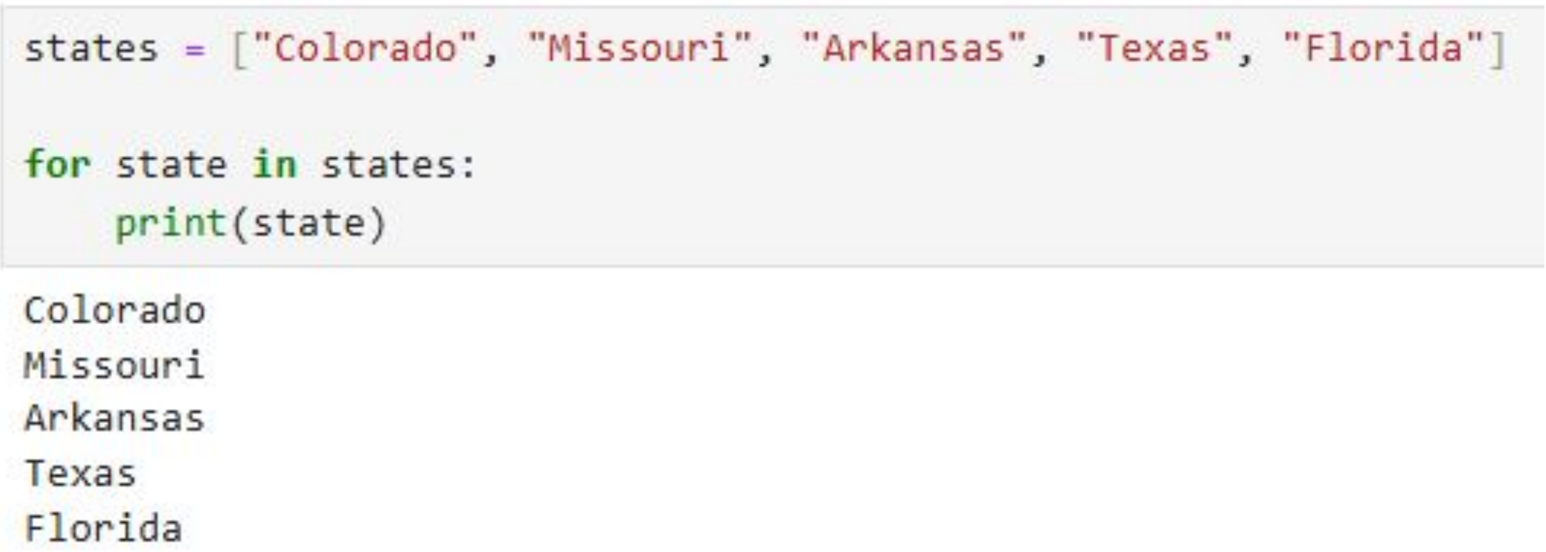
```

Loops

For loops iterate over a sequence

While loops run while a condition is true



```
states = ["Colorado", "Missouri", "Arkansas", "Texas", "Florida"]

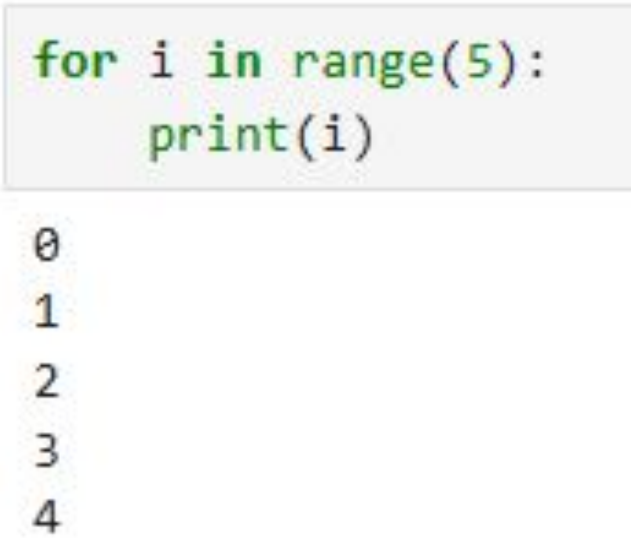
for state in states:
    print(state)
```

```
Colorado
Missouri
Arkansas
Texas
Florida
```

Loops

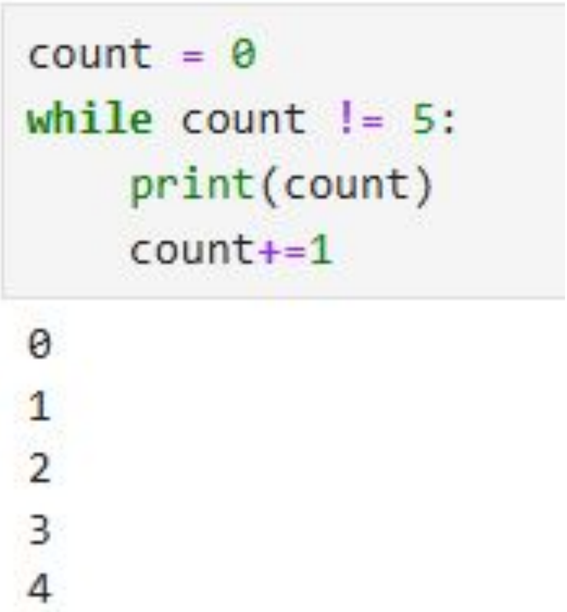
For loops iterate over a sequence

While loops run while a condition is <u>true</u>



```
for i in range(5):
    print(i)
```

```
0
1
2
3
4
```



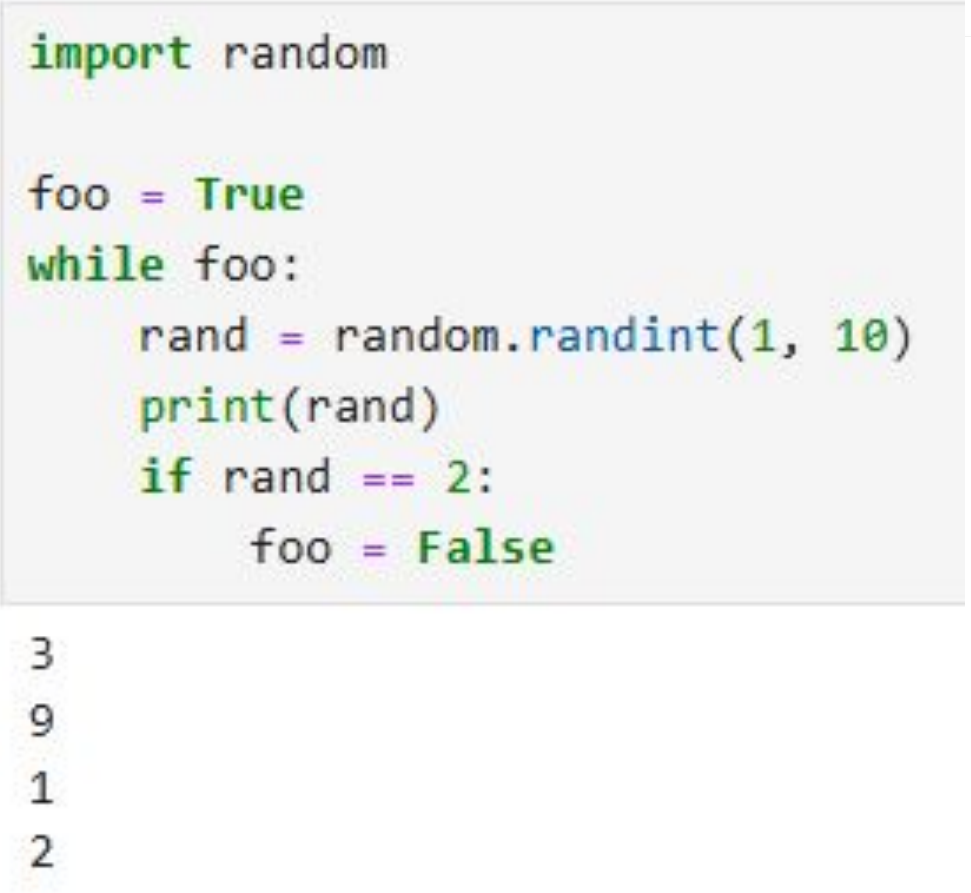
```
count = 0
while count != 5:
    print(count)
    count+=1
```

```
0
1
2
3
4
```

Loops

For loops iterate over a sequence

While loops run while a condition is true



```
import random

foo = True
while foo:
    rand = random.randint(1, 10)
    print(rand)
    if rand == 2:
        foo = False
```

```
3
9
1
2
```

Libraries

Collections of pre-written code for common tasks

Python supplies a list of it's own libraries which includes math, datetime, os, sys, random, json, re (RegEx), and more.

There are also various third-party libraries that can be added to a program.

For the purposes of future examples, we use Pandas, a data manipulation and analysis library using dataframes and matplotlib, which helps create visuals within python. We also use JSON from the standard library.

3. Example

Broad Hackathon Problem Statement

How do we leverage technology to support the OA?

4. Resources

Resources

Codecademy

LearnPython.org

YouTube

Jupyter Notebooks

Replit

Additional IDEs

Pandas

MatPlotLib

Thanks for Joining!

It’s your turn!

What can your team create?

NOAC 2024

UC Boulder

SEEK NEW HEIGHTS

Ascent Code

N-NN484991

Thank you!

Please take a moment to fill out the feedback form.

mason.pryor@shawneelodge.org