Python Foundations

A computer does two things and two things only…

…it performs calculations and it remembers the results of those calculations. (Guttag, p1)

- Your job is to tell the computer HOW to do those calculations to achieve your goals
- Goals <u>must</u> be expressed as calculations, usually very small and structured calculations
- The structuring of calculations and how one calculation follows another are governed by control statements
- Python has the ability to **calculate** and **control**

Python Calculations

Operators

- +, -, *, **, /, //, %
- +=, etc

Python Control

for

while

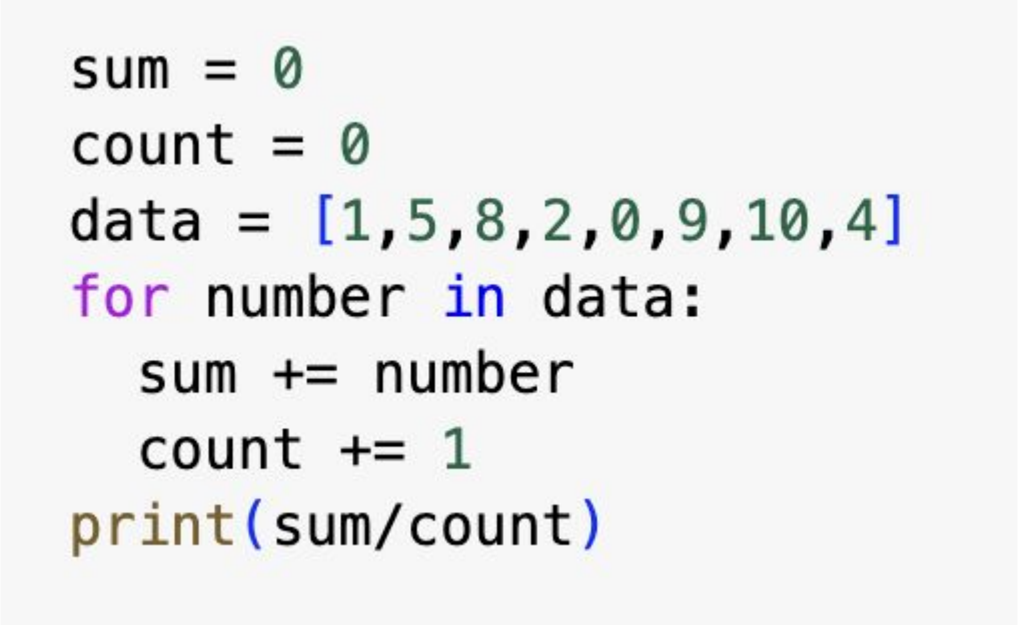
if

else

def

Code example 1

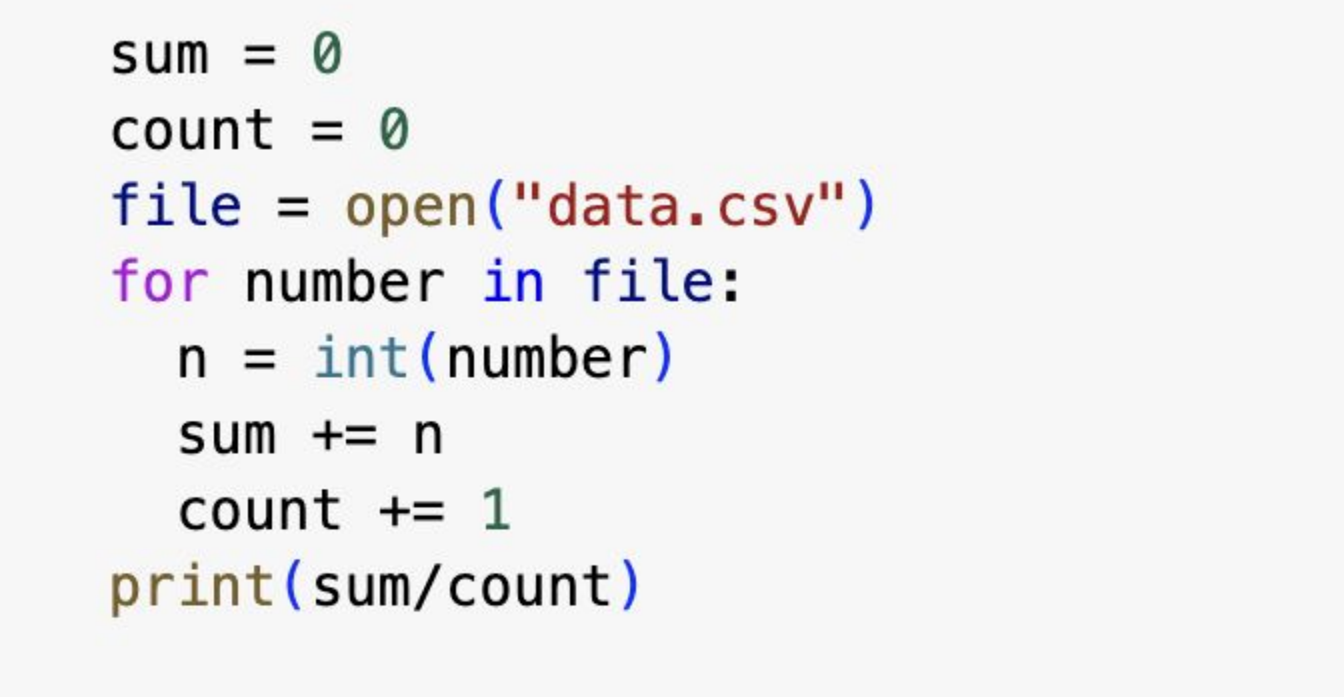
```
sum = 0
count = 0
data = [1,5,8,2,0,9,10,4]
for number in data:
 sum += number
 count += 1
print(sum/count)
```



```
sum = 0
count = 0
data = [1,5,8,2,0,9,10,4]
for number in data:
  sum += number
  count += 1
print(sum/count)
```

Code example 2

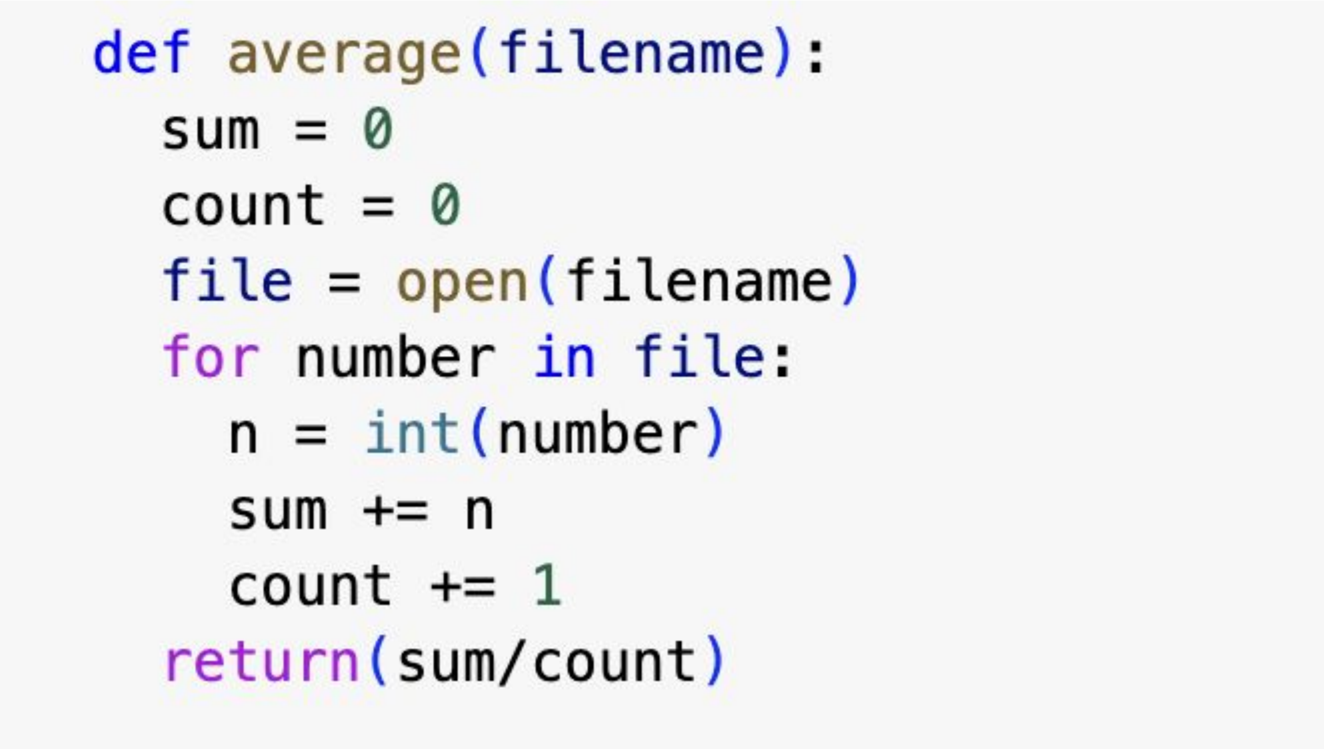
```
sum = 0
count = 0
file = open("data.csv")
for number in file:
 n = int(number)
 sum += n
 count += 1
print(sum/count)
```



```
sum = 0
count = 0
file = open("data.csv")
for number in file:
   n = int(number)
   sum += n
   count += 1
print(sum/count)
```

Code example 3

```
def average(filename):
 sum = 0
 count = 0
 file = open(filename)
 for number in file:
   n = int(number)
   sum += n
   count += 1
 return(sum/count)
```



```
def average(filename):
    sum = 0
    count = 0
    file = open(filename)
    for number in file:
        n = int(number)
        sum += n
        count += 1
    return(sum/count)
```

Code example 4

```python
from pathlib import Path

def average(filename: Path) -> float:
  """Compute average of numbers in a file named filename."""
  sum = 0
  count = 0
  file = open(filename)
  for number in file:
    n = int(number)
    sum += n
    count += 1
  return(sum/count)
```

```
from pathlib import Path
def average(filename: Path) ->
float:
 """Compute average of numbers in a
file named filename."""
 sum = 0
 count = 0
 file = open(filename)
 for number in file:
   n = int(number)
   sum += n
   count += 1
 return(sum/count)
```

Building Blocks of Code

Variables

Arithmetic Operators

Conditional Logic

Iteration

Functions

Building Blocks of Code

Variables (essentially just storage)

Arithmetic Operators (for calculations)

Conditional Logic (for control)

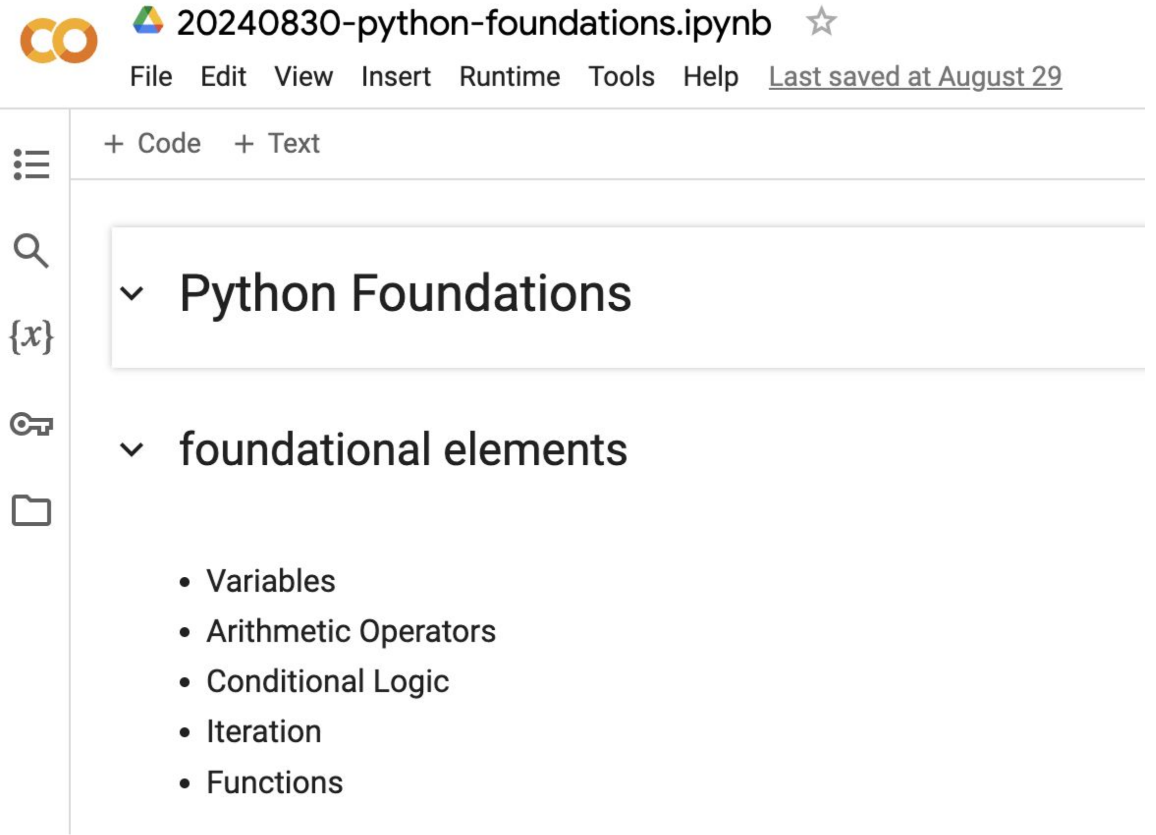
Iteration (for controlled calculations)

Functions (for convenience)

Real Examples

Google Colab

https://colab.research.google.com/github/allegheny-college-cmpsc-101-fall-2024/course-materials/blob/main/notes/20240830_python_foundations.ipynb



Python Foundations

foundational elements

- Variables
- Arithmetic Operators
- Conditional Logic
- Iteration
- Functions