Why Does My Computer Do That? Intro to Coding with Python– Mathematical Operators

Dr. Ab Mosca (they/them)

Slides based off slides courtesy of Jordan Crouser (https://jcrouser.github.io/)

Plan for Today

- More mathematical operators
- Formatting print statements

(RECAP) Core concept 2: numeric values

- Two kinds of **numbers** in CS:
  - integers ("whole numbers")
  - floats ("decimals" or "floating point numbers")
- Basic **operators**:
  - addition: `+`
  - subtraction: `-`
  - multiplication: `*`
  - division: `/`
  - integer division: `//`
  - exponentiation: `**` (power)
  - modular arithmetic: `%` (modulo)

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  - modular arithmetic: `%` (modulo)

Reviewing integer operators: // and %

What is the result of the following operations?

```
21 // 5
21 % 5
9 // 3
9 % 3
13 // 5
13 % 5
139 // 20
139 % 20
```

Reviewing integer operators: // and %

What is the result of the following operations?

```
21 // 5     # 4
21 % 5      # 1
9 // 3      # 3
9 % 3       # 0
13 // 5     # 2
13 % 5      # 3
139 // 20   # 6
139 % 20    # 19
```

Built-in functions that work on numbers

- `abs(`*`x`*`)` # return the absolute value of x
- `float(x)` # return x parsed as a float
- `int(x)` # return x parsed as an int
- `max(…)` # return the largest of a list of numbers
- `min(…)` # return the smallest of a list of numbers
- `round(`*`x`*`[, `*`n`*`])` # return *x* rounded to *n* digits after the
  # decimal point. If *n* is omitted, it
  # returns the nearest integer value
- `sum(…)` # return the sum of a list of numbers

Aside: what does **parsed** mean?

- `abs(x)` # return the absolute value of x
- `float(x)` # return x **parsed** as a float
- `int(x)` # return x **parsed** as an int
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- `round(x[, n])` # return *x* rounded to *n* digits after the
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  # returns the nearest integer value
- `sum(…)` # return the sum of a list of numbers

Aside: what does `return` mean?

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- `float(x)` # return x parsed as a float
- `int(x)` # return x parsed as an int
- `max(...)` # return the largest of a list of numbers
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- `round(x[, n])` # return *x* rounded to *n* digits after the
  # decimal point. If *n* is omitted, it
  # returns the nearest integer value
- `sum(...)` # return the sum of a list of numbers

RECAP: Keywords

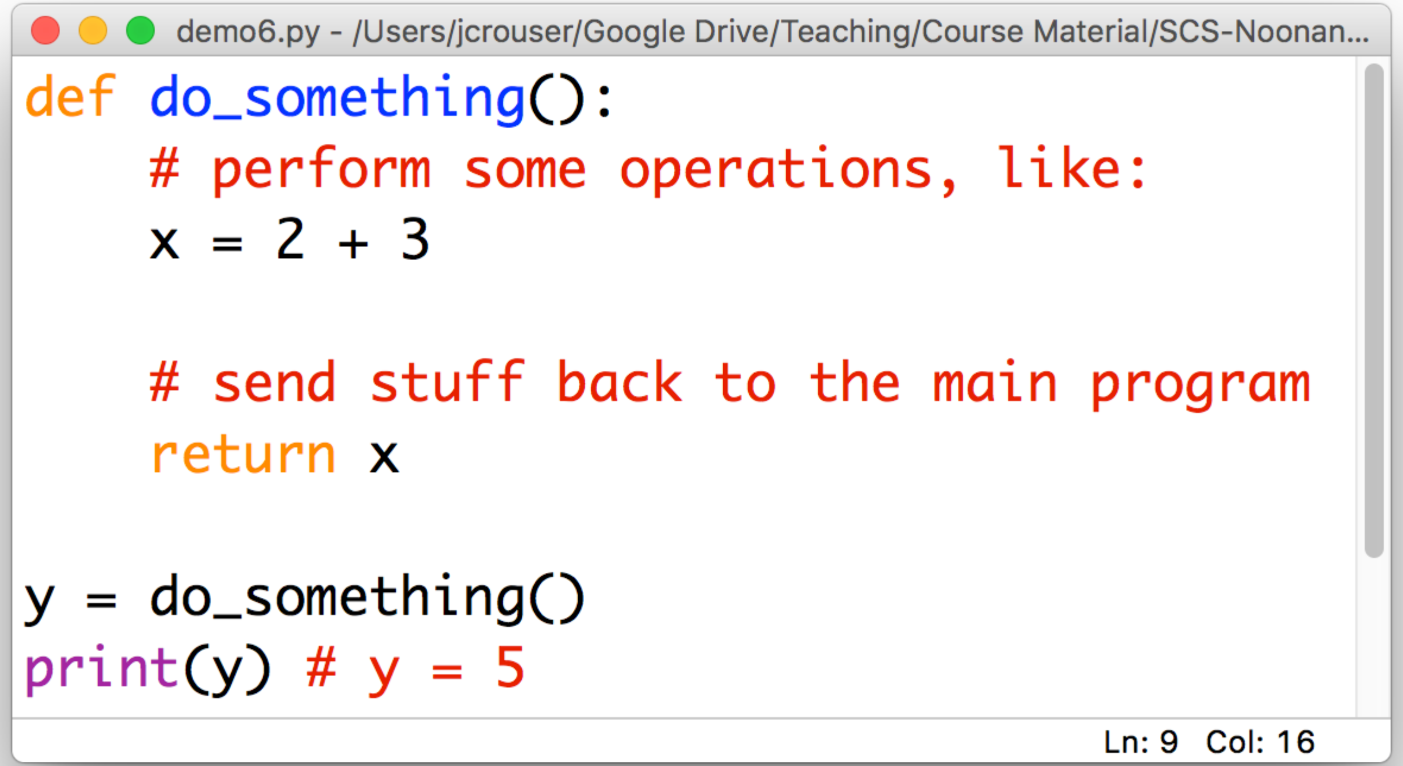
- Some words in Python* are reserved as keywords, and cannot be used as a variable name:

```
and as assert break class continue def del elif else
 except exec finally for from global if import in is
lambda not or pass raise return try while with yield
```

a reserved keyword

* other languages have their own set of reserved words

Peek ahead: “functions”


demo6.py - /Users/jcrouser/Google Drive/Teaching/Course Material/SCS-Noonan...
Ln: 9 Col: 16

```
def do_something():
    # perform some operations, like:
    x = 2 + 3

    # send stuff back to the main program
    return x

y = do_something()
print(y) # y = 5
```

The `math` module

- Lots of other things we might want to do with numerical values are available as functions in the **`math`** module

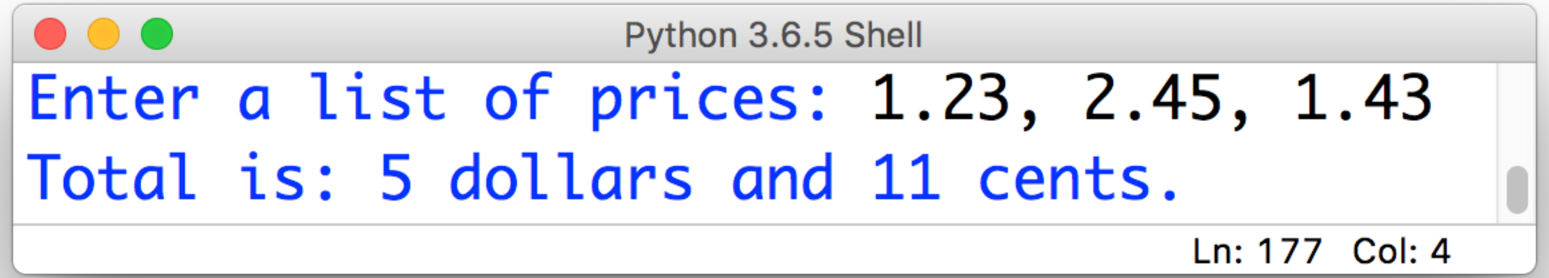
> - In Python, modules are just files containing Python definitions and statements (ex. ***`name`*****`.py`**)
> - These can be imported using **`import`** ***`name`***
> - To access **`name`**'s functions, type ***`name.function()`***

- `import math`
  - `math.floor(f)`   # round float f down
  - `math.ceil(f)`   # round float f up
  - `math.sqrt(`*`x`*`)`   # take the square root of x

And more! Check out:
https://docs.python.org/2/library/math.html

15-minute exercise: dollars and cents

Use **built-in functions** and functions from the **`math`** **module** to take a list of prices, calculate their sum, and output their total formatted like this:



```
Enter a list of prices: 1.23, 2.45, 1.43
Total is: 5 dollars and 11 cents.
```