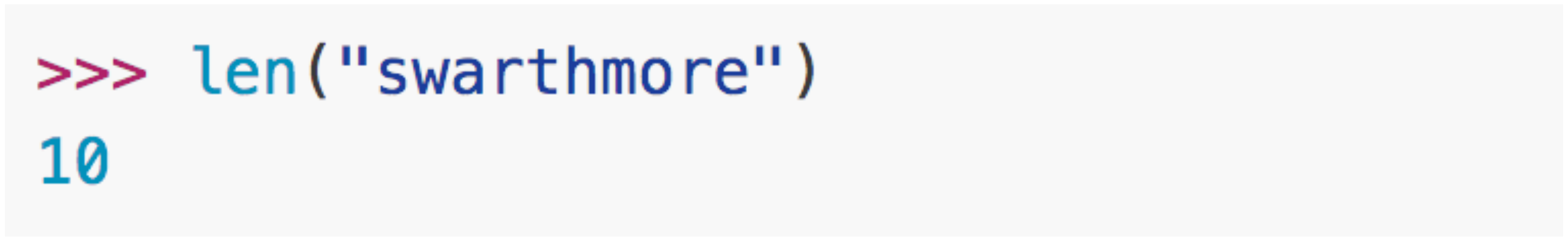
The Parts of a Program

Today's plan

- Review Wednesday's class
- Four things we see in a typical program:
  - Getting input
  - Computation
  - Displaying output
  - Repeating the process
- Basic input and output with Python

But first

- Don’t be afraid to call me out!



```
>>> len("swarthmore")
10
```

Review

- Data types: int, float, string
- Operators: +, -, *, /, %
    - Behave differently for different types
    - Promotion
    - Integer division rounds down

Review

- Conversion functions: int(), float(), str()
- Building up more complex expressions
    - Combine operators with functions and parentheses
    - Python reduces or evaluates expressions until they're devoid of variables, functions, operators, parentheses: 17, -3.4, "hello"

Review: Assignment

- Variable name goes to the left of =
    - Variables are case-sensitive, can include letters, numbers, and the underscore, _
    - Variables can’t start with a number
    - Strings go in quotes, variables do not
- An expression goes to the right of =
    - Python evaluates it, associates it with the variable

Review: Assignment

- We can later re-assign the variable to a new value

- We can’t use a variable in an expression before it has been assigned a value

Program pieces

- Input
    - Keyboard, mouse, touch screen, voice
- Computation
    - Retrieving data, doing math, algorithms
- Output
    - Text, graphics, sounds, other forms of feedback
- Repeat

Example: Google search

- Input
    - User types search query
- Computation
    - Algorithm: correct typos, find relevant websites, rank them
- Output
    - Show top results on the screen
- Repeat
    - Do the same thing again on next query

Example: Instagram app

- Input
  - User scrolls down / taps ‘like’ button
- Computation
  - Algorithm: retrieve next photos / update number of likes
- Output
  - Show new photos / updated number of ‘likes’
- Repeat
  - Continue responding to scrolls and taps

Our programs

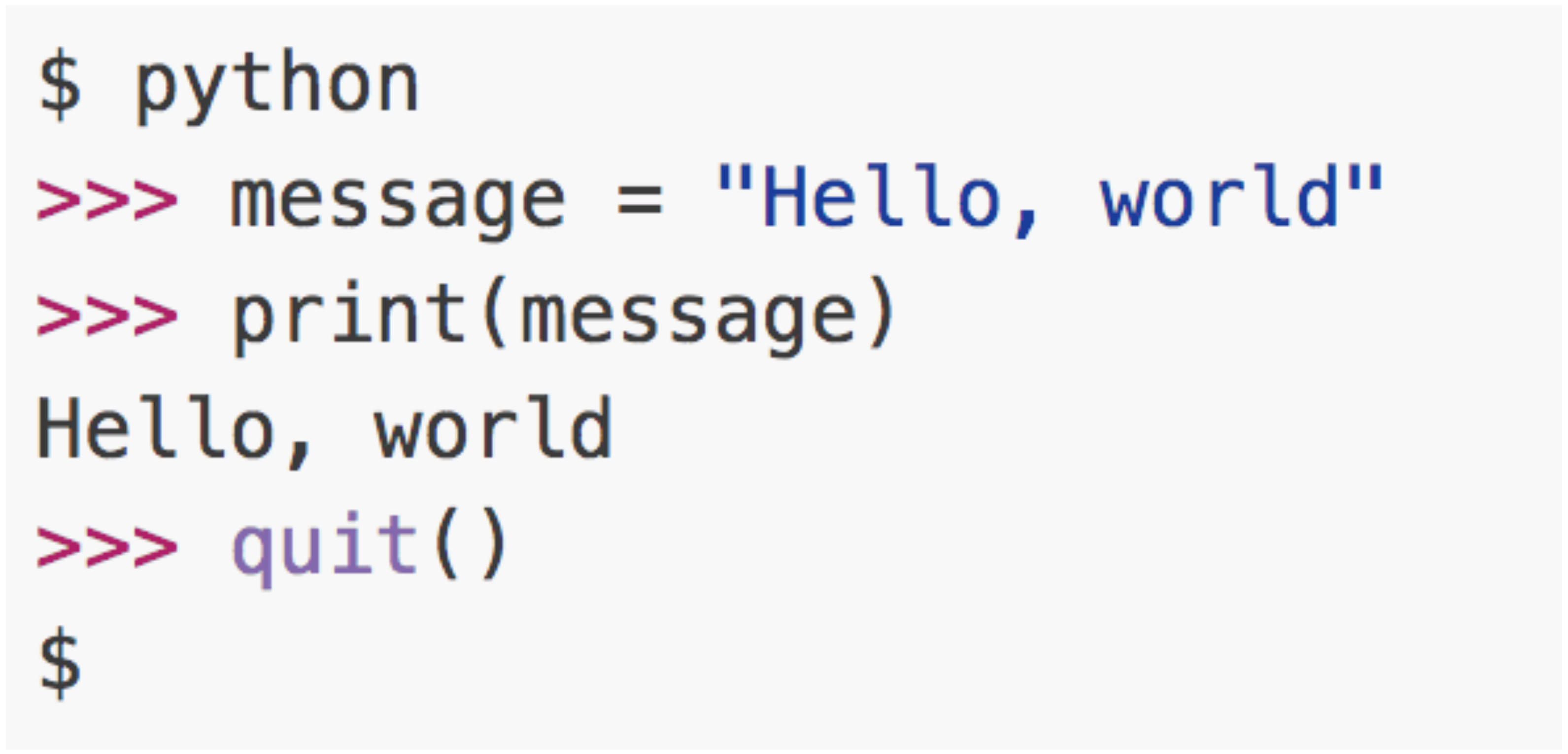
- Input
  - raw_input() function
- Computation
  - +, -, *, /, %, len, int, str, float
- Output
  - print() function
- Repeat
  - For now, just run the program again

Let’s write programs

- Waitlist students: codeskulptor.org

Python shell vs. Python program

- The Python shell lets you try lines of code one at a time and see their effect



```
$ python
>>> message = "Hello, world"
>>> print(message)
Hello, world
>>> quit()
$
```

Python shell vs. Python program

- With a Python program you can put multiple instructions together

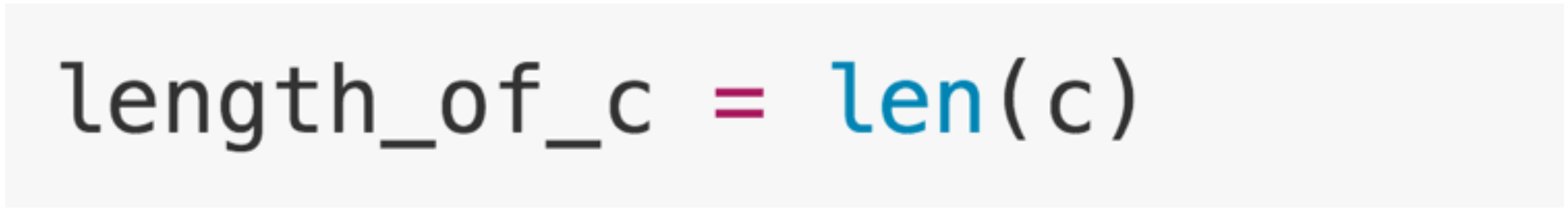
```
$ vim mycalculation.py
[Edit file in vim]
$ cat mycalculation.py
# This is a comment
product1 = 234 * 345
product2 = 87 * 33
total = product1 + product2
print("The result of my calculation is: " + str(total))
$ python mycalculation.py
The result of my calculation is: 83601
$
```

Functions

- Expanded notion of a function:
  - Takes zero or more **arguments**
  - Possibly has **side effects**: printing, getting user input, etc.
  - Possibly produces a **return** value

len function

- One argument: any string (or expression that evaluates to a string)
- Side effects: none
- Returns: number of individual characters in that string



```
length_of_c = len(c)
```

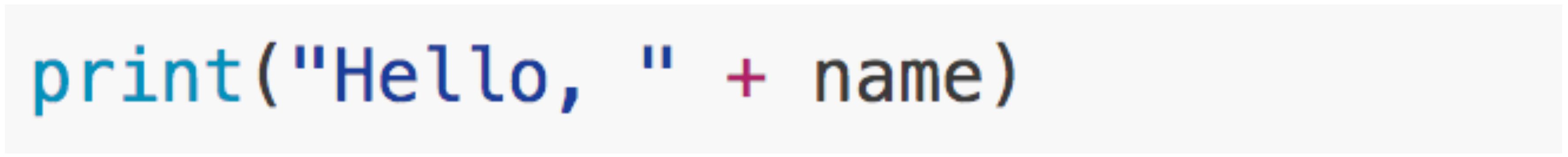
raw_input function

- One argument: a string containing the prompt
- Side effect: stops the program to wait for user input
- Returns: a string containing what the user typed

```
name = raw_input("Enter your name: ")
```

print function

- One argument: the string you want to print
- Side effect: displays the string (without quotes)
- Returns: nothing



```
print("Hello, " + name)
```

Have a nice weekend!