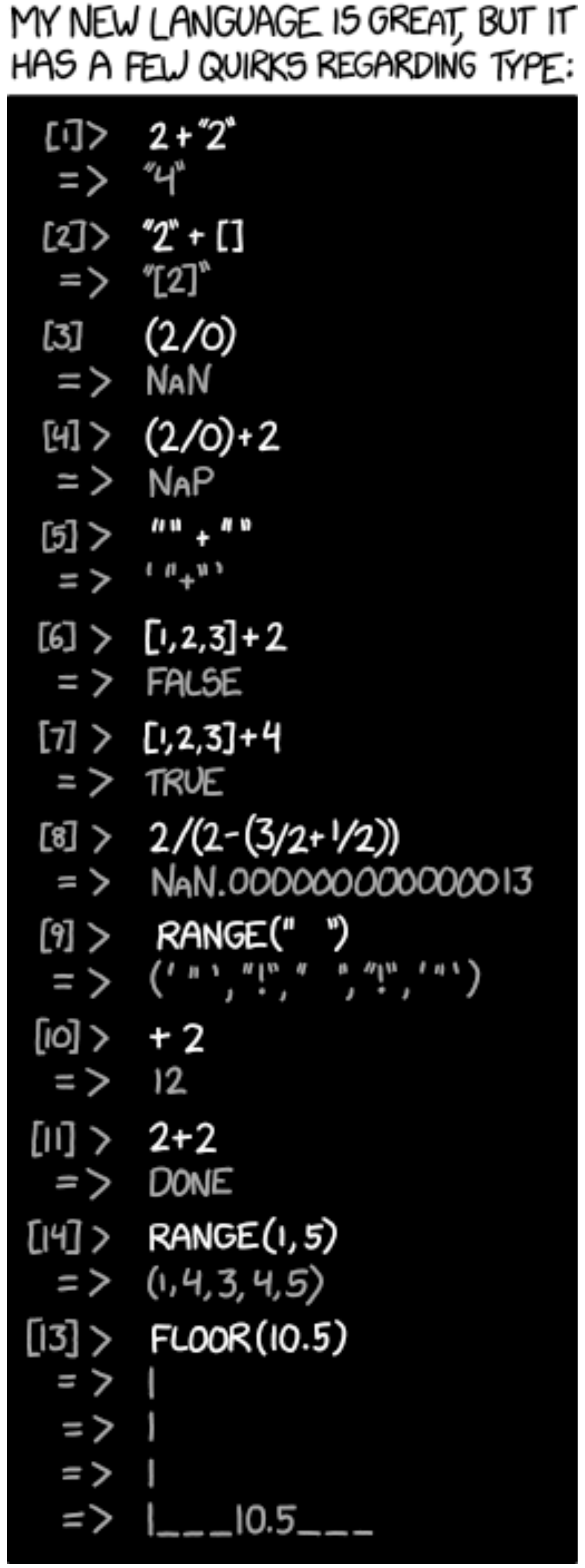
CSCI 141

Lecture 3
Introduction to Data:
Types, Values, Function Calls,
Variables


MY NEW LANGUAGE IS GREAT, BUT IT HAS A FEW QUIRKS REGARDING TYPE:

```
[1]>  2+"2"
 =>   "4"
[2]>  "2" + []
 =>   "[2]"
[3]   (2/0)
 =>   NaN
[4]>  (2/0)+2
 =>   NaP
[5]>  "" + ""
 =>   '"+"'
[6]>  [1,2,3]+2
 =>   FALSE
[7]>  [1,2,3]+4
 =>   TRUE
[8]>  2/(2-(3/2+1/2))
 =>   NaN.0000000000000013
[9]>  RANGE(" ")
 =>   ('"', "!", " ", "!", '"')
[10]> +2
 =>   12
[11]> 2+2
 =>   DONE
[14]> RANGE(1,5)
 =>   (1,4,3,4,5)
[13]> FLOOR(10.5)
 =>   |
 =>   |
 =>   |
 =>   |___10.5___
```

Happenings

- CS Resume Workshop 5-6pm on Wednesday, October 2nd CF 115
  Presented by Filip Jagodzinski, students questions about writing resumes and cover letters will be answered while enjoying… PIZZA!

- Tech Talk: Google on Monday, October 7th 5-6pm in CF 115
  Googlers share a day-in-the-life as a software engineer
  Resume review with Google on Monday, 10/7 during the day—sign up here

- **Accenture** on Tuesday October 8th 4-6pm CF 110
  Resume prep, with interviews to follow October 30th-November 1st

- Tech Talk: Microsoft on Wednesday, October 9th 5-6:30pm in CF 115
  Powershell: From Windows to the Cross-Platform Cloud

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    - Reminder: You can download Thonny from thonny.org.
- Please keep track of the hours you spend

Socrative

Please log in at the beginning of class so you're ready when poll questions come up.

Reminder:

- socrative.com (or get the app)
- Room: 9AM141
- Student ID: Your WWU username.

QOTD

- You are given 3 "slip days" that allow you to submit something 24 hours late without penalty.
  T/F: These can be used for labs, assignments, or QOTDs.

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Special circumstances for missing lab or submitting late? Email me.

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- **T/F:** All programming assignments are expected to take approximately the same amount of time to complete.

QOTD

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✗ **False.**

QOTD

Where are lecture slides posted after lecture?

A. Socrative

B. Gradescope

C. Canvas

D. The course webpage

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A. Talking about your code with your classmates.

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Goals

- Understand that data of different types is represented on a computer in different ways, and know the meaning of the following types:
    - `str`, `int`, `float`
- Know how to use the type conversion functions `int`, `float`, `str`
- Understand the syntax for calling functions with arguments, and know how to use the following functions:
    - `print` (with multiple arguments) `input` (with a prompt argument)
    - `type`
- Know how to name and store values using variables and the assignment operator

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- Functions and function calls...

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```

`input` is called with no arguments here

Function Calls

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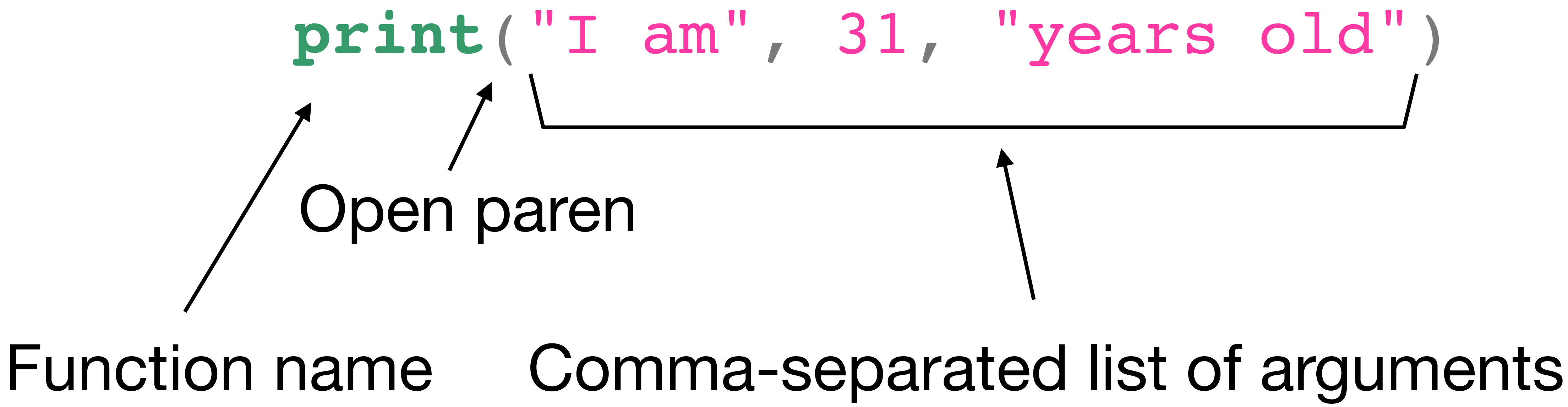

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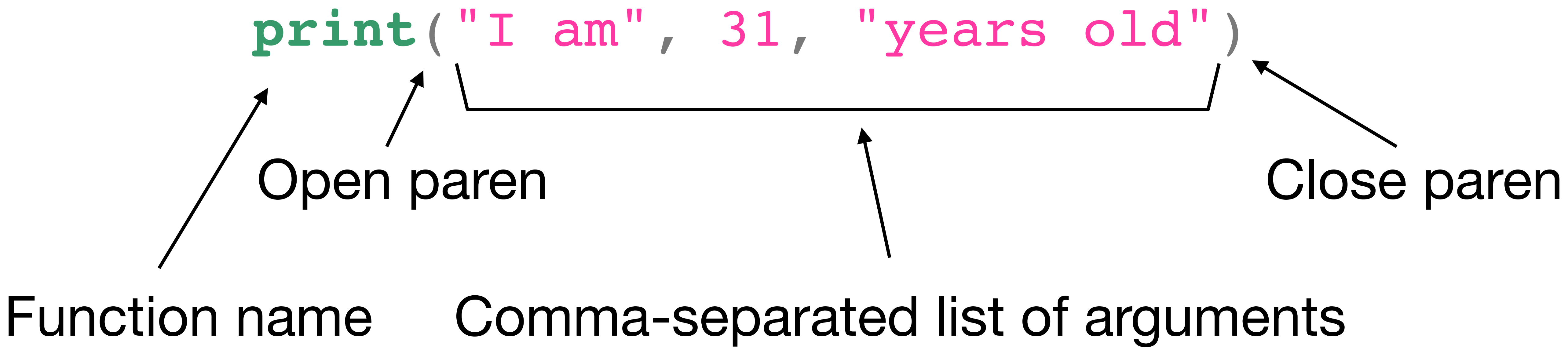

```
print("I am", 31, "years old")
```

Poll: Print 1

What does the following code print?

```
print("CSCI", 99 + 42, "at WWU")
```

A. `CSCI141atWWU`

B. `"CSCI 141 at WWU"`

C. `CSCI 141 at WWU`

D. `CSCI 99 + 42 at WWU`

Poll: Print 2

How many **arguments** are there to the following call to the print function?

```
print("CSCI", 99 + 42, "at WWU")
```

Today: Data

What is data, anyway?

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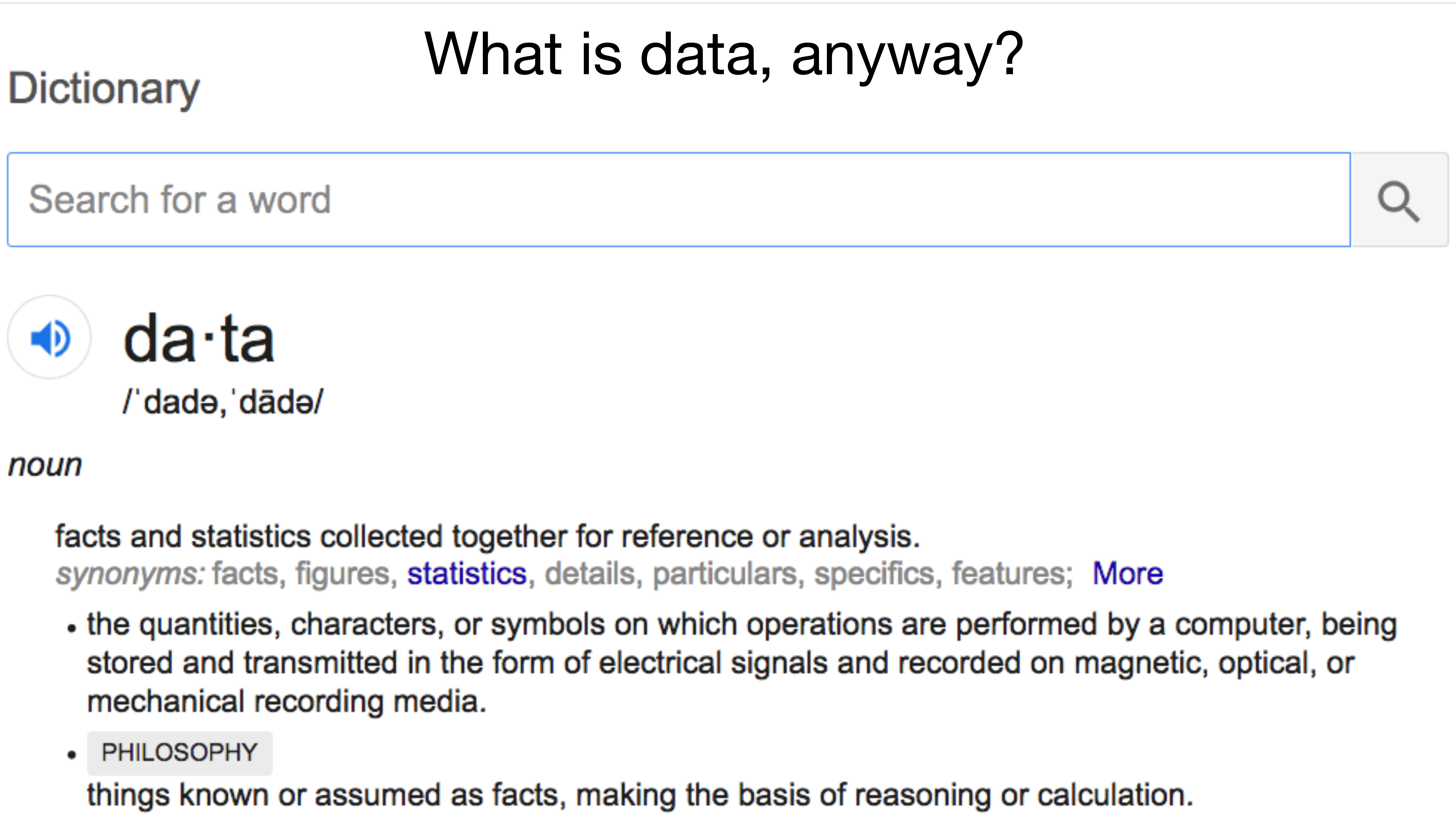

Dictionary

Search for a word

da·ta

/ˈdadə,ˈdādə/

noun

facts and statistics collected together for reference or analysis.

synonyms: facts, figures, statistics, details, particulars, specifics, features; More

- the quantities, characters, or symbols on which operations are performed by a computer, being stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.
- PHILOSOPHY

  things known or assumed as facts, making the basis of reasoning or calculation.

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    - 3.14

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- We've seen 2 already:
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  - 3 (as in 3 * 4 + 2) Integer (type `int`)
- Here's another:
  - 3.14 Floating-point number (type `float`): a number with a decimal point

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    - can you compute `10 + "Scott"`?

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  - Need to know how to store it in memory (how to encode it as 1's and 0's)
  - Need to know what you can *do* with it
    - can you compute `10 + "Scott"`?
    - what about `1.1 + 2`?

Data Types

- How do you find out what type a piece of data is?
    - Just ask!
    - Python has a function called `type` which tells you the type, or class, of any value.

The `type` Function

- The type function takes one piece of data (a value) and gives back the type of the value.

- Examples:

Function call:	Result:
`type(16)`	`<class ‘int’>`
`type(“CSCI 141”)`	`<class ‘str’>`
`type(16.0)`	`<class ‘float’>`

16.0 is (mathematically) an integer, but the decimal point causes it to be interpreted as a `float`.

Got that?

What will be the result of calling:

```
type(1.2)
```

A. `<class ‘str’>`

B. `<class ‘float’>`

C. `<class ‘int’>`

D. `<class ‘String’>`

Got that?

What will be the result of calling:

```
type("1.2")
```

A. `<class 'str'>`

B. `<class 'float'>`

C. `<class 'int'>`

D. `<class 'String'>`

Data Type Conversions

- What if you have `“1.4”` (class `str`) but you want `1.4` (class `float`)?
- Here are three more functions:

```
int()

float()

str()
```

- Each tries to convert its argument to the given type, and throws an error if it’s not possible.

`type` and type conversions: demo

Types and type conversions: demo

- int to int
- int to string
- float to int
- string to int
- string to float

`print` and `input`

- `print` can take any number of arguments, of any type.
  - Non-string arguments will be converted into strings
  - Arguments are printed in sequence, separated by a space
- `input` can take zero or one arguments
  - If given one argument, the argument is printed as a prompt before waiting for input.

Advanced Print and Input: Demo

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- Print with multiple arguments, including non-strings
- Print with no arguments
- Input with a prompt

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The Assignment Operator: Not “Equals”

```
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```

The assignment operator.

- This is not *stating an equality*, like in math.
- It is *associating a name with a value*.

```
my_age = 31
my_age = 32
```

(whiteboard) a simple diagram of what's happening here

Using Variables

- Assigning a value is **not** stating an equality, like in math: it's storing a value.

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my_age = 31
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A variable's value can be **updated** (overwritten) by a new value using the assignment operator.

"my_age equals 32"

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What can you do with variables?

Use them anywhere you'd use a value!

```
print(5)
```

```
a = 5
print(a)
```

These two programs both print 5.

Variable Names

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  2. **Decide on a sensible name**
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  - start with a letter or an underscore (_)
  - can contain any letters and digits
  - are case-sensitive (name is not the same as Name)
  - are not the same as any Python language **keywords** (words that already mean something else):

```
False, None, True, and, as, assert, async, await, break, class,
continue, def, del, elif, else, except, finally, for, from,
global, if, import, in, is, lambda, nonlocal, not, or, pass,
raise, return, try, while, with, yield
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```
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✗ `True`   ✗ `2plus2`   ✓ `a_number`   ✓ `firstOfThreeValues`

Variable Names

- Great power, great responsibility:
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- A **good** variable name:
  - is descriptive - tell a reader what data they refer to
  - is not too long
  - follows a standard naming convention, e.g.:
    - starts with lower case letter
    - words are separated by underscores

```
current_time              a4           hair_color
        midterm_exam_grade_as_a_percent
```

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  variables names can be almost anything!
- A **good** variable name:
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  - is not too long
  - follows a standard naming convention, e.g.:
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    - words are separated by underscores

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        midterm_exam_grade_as_a_percent
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Next time

- More variables
- Operators
- Expressions
- Arithmetic