DS 100 – Intro to Data Science

Lecture 2 – Data Types

01/23/2025

Adam Poliak

Announcements

HW 00

- Due Wednesday (01/29)

Lab 00

- Due Friday (01/24)

Labs

Labs help solidify the concepts

Completing labs will help you master the course material

Grade for labs will be based on Gradescope

How’d lab00 go?


Python
brynmawr.edu

Python

Popular for data science & software development

Focus on mastering language fundamentals

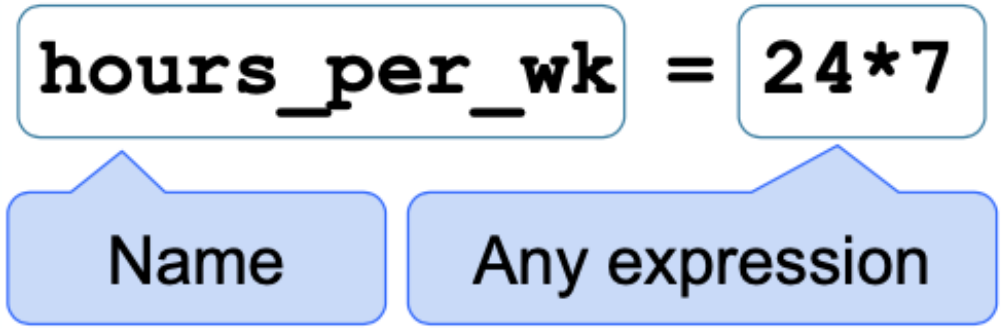
Learn through practice and doing

Follow along in the demos

Names

brynmawr.edu

Assignment Statements



Statements perform an action

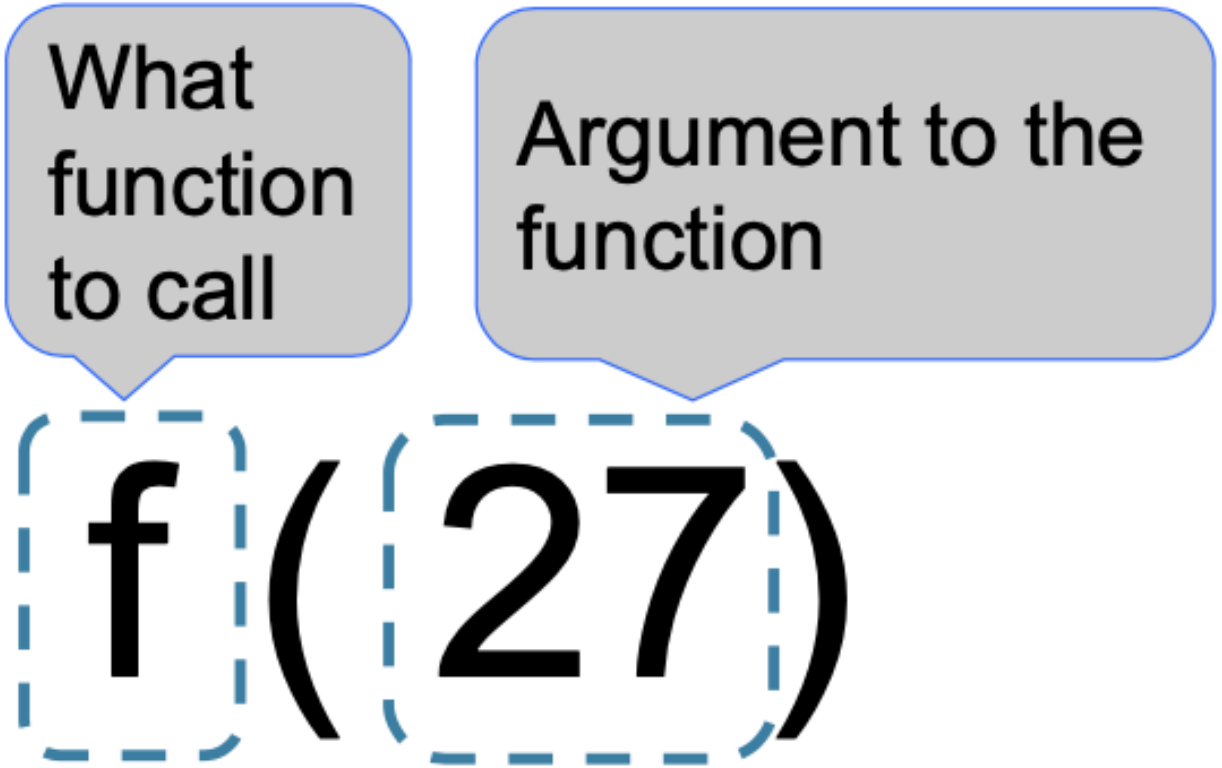
don’t have a value

Assignment statement changes the meaning of the name to the left of the = symbol

The name is bound to a value

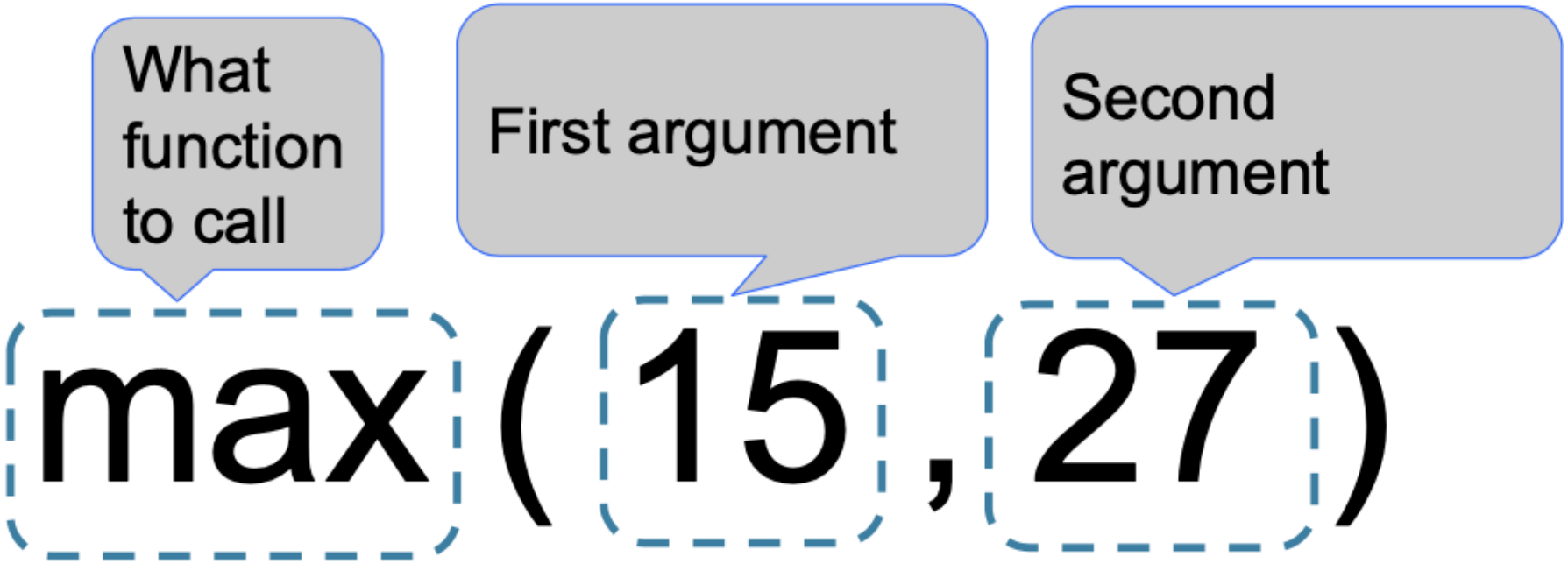
Functions

Anatomy of a Call Expression



"Call f on 27."

Anatomy of a Call Expression



Numbers

Numbers – integers and floats

Two real number types in Python

int: an integer of any size

float: a number with an optional fractional part

An **int** never has a decimal point; a **float** does

A **float** might be printed using scientific notation

Float limitations

Floats have limited size (the limit is huge)

Floats have limited precision of 15-16 decimal places

After arithmetic, the final few decimal places can be wrong

Strings

Strings

A string value is a snippet of text of any length

- ‘a’
- ‘word’
- “there can be 2 sentences. Here’s the second!”

Strings consisting of numbers can be converted to numbers

int(‘12’), float (‘1.2’)

Any value can be converted to a string

str(5) becomes “5”

Discussion Questions

Assume you have run the following statements:

```
x = 3
y = '4'
z = '5.6'
```

What is the source of the error in each example?

A. `x + y`
B. `x + int(y + z)`
C. `str(x) + int(y)`
D. `y + float(z)`

Types – every value has a type

We've seen 5 types so far:

- int: 2
- float: 2.2
- str: 'Red fish, blue fish'
- builtin_function_or_method: abs, max, min

Types – every value has a type

The type function tells you the type of a value

- type(2)
- type(2+2)

An expression's "type" is based on its value

- x = 2
- type(x) = ???

Conversion

Strings that contain numbers can be converted to numbers

- int("12")
- float("1.2")
- float("one point two") # Not a good idea

Conversion

Any value can be converted to a string

- str(6)

Numbers can be converted to other numeric types

- float(1)
- int(2.3). # DANGER: why is this a bad idea

Tables

Table Structure

A Table is a sequence of labeled columns

Row: represents one individual

Column: represents one attribute of the individuals

Name	Code	Area (m2)
California	CA	163696
Nevada	NV	110567

Creating a Table

`Table.read_table(filename)` – reads a table from a spreadsheet

`Table()` – an empty table

Table methods

Creating and extending tables:

- Table().with_column and Table.read_table

Finding the size:

- num_rows , num_columns

Referring to columns: labels, relabeling and indices

- labels and relabeled; column indices start at 0

Some Table operations

t.select(label) – constructs a new table with just the specified columns

t.drop(label) – constructs a new table in which the specified columns are omitted

t.sort(label) – constructs a new table with rows sorted by the specified column

t.where(label, condiction) – constructs a new table with just the rows that match the condition

These operations create a new table

Some Table operations

Accessing data in a column

- Column takes a label or index and returns an array

Using array methods to work with data in columns

- item, sum, min, max, and so on

Creating new tables containing some of the original columns

- select, drop