CompSci 190: Functions

Jeff Forbes

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Comparison Operators

The result of a comparison expression is a **`bool`** value

```
x = 2                    y = 3
```

Assignment statements

```
x > 1                    x > y                    y >= 3

x == y                   x != 2                   2 < x < 5
```

Comparison expressions

(Demo)

Combining Comparisons

Boolean operators can be applied to **`bool`** values

```
a = True        b = False
```

Evaluate to **`True`**

```
not b           a or b              a and not b
```

```
a and b         not (a or b)        b and b
```

Evaluate to **`False`**

(Demo)

Aggregating Comparisons

Summing an array or list of bool values will count the True values only.

```
1     + 0      + 1                 == 2
True + False + True               == 2
sum([1    , 0      , 1    ))     == 2
sum([True, False, True))         == 2
np.count_nonzero(([True, False, True)) == ?
```

(Demo)

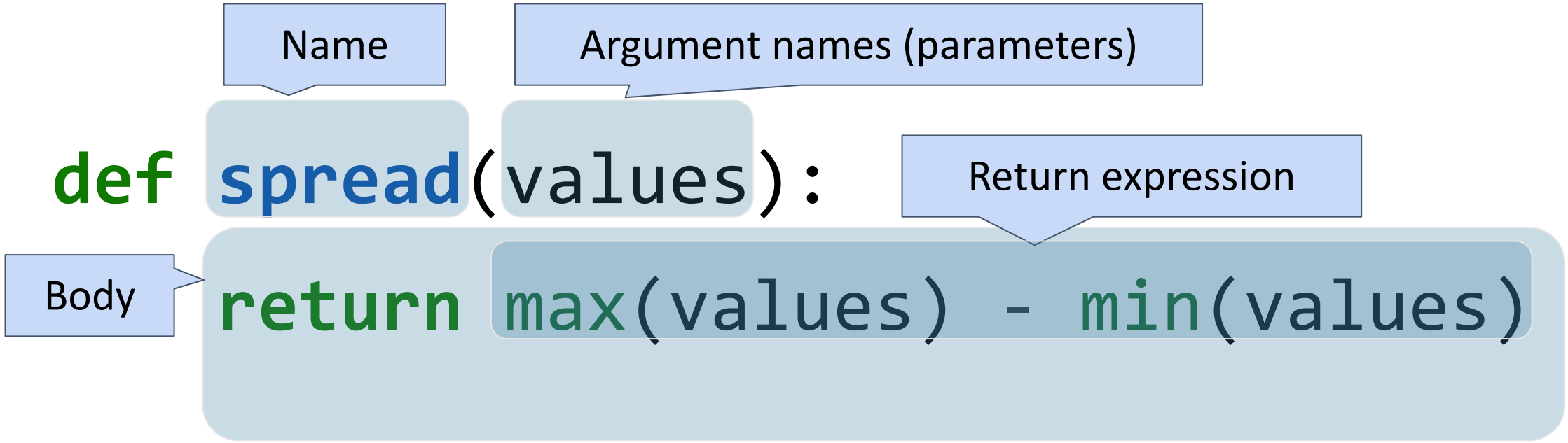
More Python Commands

- Printing
  - Use **`print`** to display the value of a variable
- Control Statements
  - The purpose of **`if`** is to define functions that choose different behavior based on their arguments
  - The purpose of **`for`** is to perform a computation for every element in a list or array

(Demo)

Defining Functions

User-defined functions give names to blocks of code



Discussion Question

What does this function do? What kind of input does it take? What output will it give? What's a reasonable name?

```
def f(s):
    return np.round(s / sum(s) * 100, 2)
```

(Demo)

Apply

The **`apply`** method creates an array by calling a function on every element in one or more input columns

- First argument: Function to apply
- Other arguments: The input column(s)

```
table_name.apply(one_arg_function, 'column_label')

table_name.apply(two_arg_function,
                 'column_label_for_first_arg',
                 'column_label_for_second_arg')
```

`apply` called with only a function applies it to each row

(Demo)

Applying functions to tables

- Go back to Lab 3, Questions 3 and 4
- Work in groups on the problems

Group

The `group` method aggregates all rows with the same value for a column into a single row in the result

- First argument: Which column to group by
- Second argument: (Optional) How to combine values
  - `len` — number of grouped values (default)
  - `sum` — total of all grouped values
  - `list` — list of all grouped values

(Demo)

Grouping By Two Columns

The `group` method can also aggregate all rows that share the combination of values in multiple columns

- First argument: A list of which columns to group by
- Second argument: (Optional) How to combine values

(Demo)

What's next?

- Read Chapter 8-9 of *Computational and Inferential Thinking*

- Start working on Project 1