CompSci 190: Functions

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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)

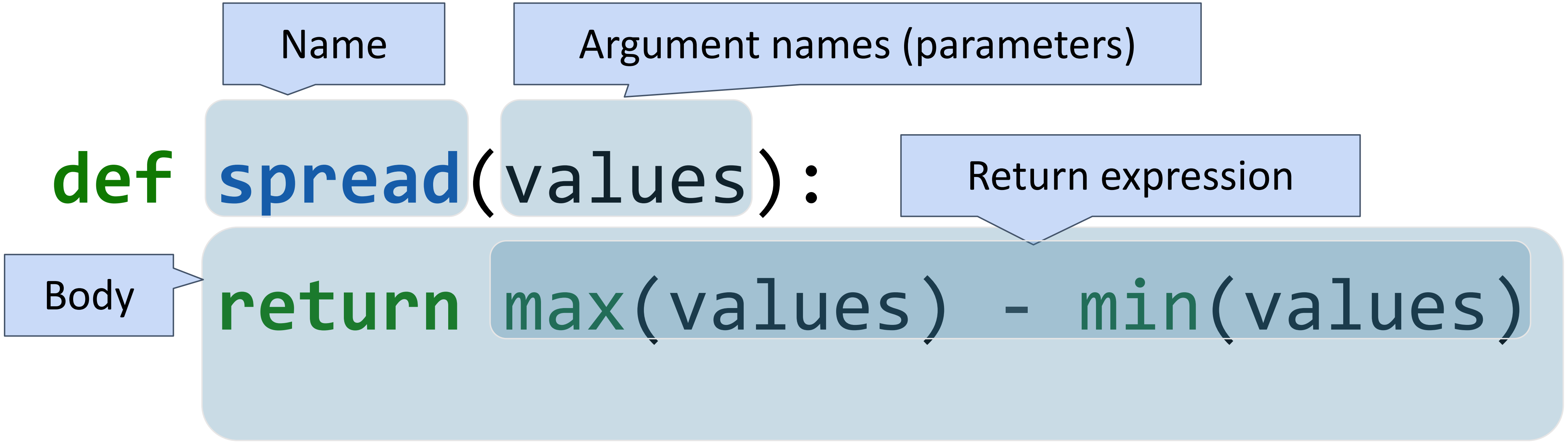
More Python Commands

- 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



```
def spread(values):
    return max(values) - min(values)
```

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

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

What’s next?

- Read Chapter 8-9 of *Computational and Inferential Thinking*
- Continue working on Project 1