

Introduction to Python

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Outline

Variables and Types

Operations on different types

Lists

Intro to Python functions

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Assigning variables

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`<variable name> = <assigned value>.`

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```

- ▶ Possible to assign more than one variable in one line.

```
1 | x, y = 5.11, 5
2 | # or, you could use
3 | x = 5.11; y = 5
```

Data type

Each variable has a *data type* (or, simply *type*).

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↑ the types of the assigned vars are **float**, **int**, and **str** respectively.

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Unlike in other programming languages, don't need to declare the types of the variables. Python *interprets* it. (The type might even *change* at a later point.)

- ▶ type **int**: like an integer.
- ▶ type **float**: like a real number in decimal form ...*kind of*.
- ▶ type **str**: a “string,” or sequence of *characters* (that can be typed from keyboard). Will return to this again.

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Assigning after an operation. **Very** often want to change a variable by some amount (e.g., increase it by 1); to keep new value, *reassign* after the operation.

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1 | y = y + 1
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This is *not* a mathematical equation, but an assignment. The shorthand works for other operations.

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The *null* type in Python is None. We'll talk about using it in later lectures.

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The + operation is defined on lists. It results in the *concatenation* of the lists – putting them together, end to end.

```
1 | # the code below outputs [2, 3, 5, 'p', 11, 13]  
2 | my_list + [11, 13]
```

Other operations on lists

- Multiplication by an integer: adds that many copies of the list together. For example, $[1,2]*3$ will result in $[1,2,1,2,1,2]$, since

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- Length of a list: use the function `len()`, with your list as input, to get the number of items in your list.
- Checking if an item is in a list: use the *keyword* `in` to check this. For example, if `my_list` is `[2, 3, 5, 'p']` then the first line below would result in `True`, the second would be `False`.

```
1 | print( 2 in my_list )  
2 | print( 4 in my_list )
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- ▶ Above, the variable that was assigned 'Chris Cornwell', and the item 'p' in `my_list`, each is a string.
- ▶ *Thinking* of a string as a list of single characters, operations on strings work like they do on lists (e.g., `+` will concatenate and `len()` gives the number of characters, etc.

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Escape characters can be handled inside strings also: e.g., `'\t'` will produce a tab; `'\n'` produces a newline.

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Two important types that contain items, but are not sequential are sets (**set** type) and dictionaries (**dict** type).

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- ▶ Two example dictionaries with same keys:

```
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Good idea to work with dictionaries for certain kinds of data. Later in the semester, will work with something very similar to a dictionary – a DataFrame.

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In Python, run the following to see how `round()` works.

```
1 | a = -3**2/8
2 | print( a+8 )
3 | print( (round(a+8), round(a+8, 2)) )
```

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Some examples:

- ▶ `str()` changes to a string; works on nearly anything.
- ▶ `int()` will convert a float to an int; always rounds toward 0.
- ▶ `set()` will convert a list or tuple into a set; “forgets” order, drops repeats.

Slicing lists

Recall: if `my_list` is a list, the item at index `i` is found with `my_list[i]`.
To get shorter list with consecutive items from `my_list`.

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1 my_list = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i']
2 # Return letters at index 1 to 4 (excluding 4)
3 print(my_list[1:4])
4
5 # Leave off number either left of colon, or right of it;
6 # will go from the start, or until the end
7 print(my_list[:5])
8
9 # Negative numbers to step back from end of the list
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There is an easy way to reverse the order of a list.²

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| my_list[::-1]
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 - ▶ Changes `my_list` in place, making it shorter.
 - ▶ `my_list.pop(i)` does something similar with item at index `i`, but also returns (has as output) that item.

More information on working with lists, tuples, sets, and dictionaries:

[Tutorial from the Python documentation.](#)