



Intro to Lists

(if you have your computer today, get VSCode ready!)

Announcements

EX03 (List Utils) due Monday, September 29 at 11:59pm

- You'll be writing 3 functions!

LS10 (Lists) due tonight at 11:59pm

Quiz 01 has been published!

- Please submit a regrade request if you believe a question was graded incorrectly!

Lists

Examples of lists:

- To-do list
- Assignment due dates
- Grocery list

A list is a **data structure**—something that lets you organize and store data in a format such that they can be accessed and processed efficiently.

Lists are **mutable**, meaning their values can be changed after initialization.

NOTE: Lists can be an arbitrary (but finite) length! (Not a fixed number of items.)

Lists are Mutable Sequences in Python

Sequences are ordered, 0-indexed collections of values

Feature	Syntax	Purpose
Type Declaration		
Constructor (function)		
List Literal		
Access Value		
Assign Item		
Length of List		

Declaring the type of a list

<list name>: list[<item type>]

grocery_list: list[str]

Declaring the type of a list

<list name>: list[<item type>]

grocery_list: list[str]



str, int, float, etc.

Initializing a list

With a constructor:

The constructor **list()** is a *function* that returns the literal `[]`

- `<list name>: list[<item type>] = list()`
- `grocery_list: list[str] = list()`

With a literal:

- `<list name>: list[<item type>] = []`
- `grocery_list: list[str] = []`

declare variable

initialize list

“create a var called `grocery_list`, a list of strings, which will initially be empty”

Initializing a list

With a constructor:

The constructor **list()** is a *function* that returns the literal `[]`

- `<list name>: list[<item type>] = list()`
- `grocery_list: list[str] = list()`

With a literal:

- `<list name>: list[<item type>] = []`
- `grocery_list: list[str] = ["apples", "bananas", "pears"]`

declare variable

initialize list

“create a var called `grocery_list`, a list of strings, which will initially contain these values”

Initializing a list

With a constructor:

- `<list name>: list[<item type>] = list()`
- `grocery_list: list[str] = list()`

The constructor **list()** is a *function* that returns the literal `[]`

Bringing it back to something we know, you can create an empty string using the constructor **str()** or the literal `""`

With a literal:

- `<list name>: list[<item type>] = []`
- `grocery_list: list[str] = []`

Initializing a list

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With a literal:

- `<list name>: list[<item type>] = []`
- `grocery_list: list[str] = []`

Let's try it!

Create an empty list of floats with the name `my_numbers`.

Adding an item to the end of a list


`<list name>.append(<item>)`

`grocery_list.append("bananas")`

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grocery_list.append("bananas")

- 
- Method: a function that *belongs* to the **list** class
 - Like calling `append(grocery_list, "bananas")`

Adding an item to the end of a list

<list name>.append(<item>)

grocery_list.append("bananas")

- 
- Method: a function that *belongs* to the **list** class
 - Like calling `append(grocery_list, "bananas")`

Let's try it!

Add the value 1.5 to my_numbers.

Initializing an already populated list

<list name>: `list[<item type>]` = [`<item 0>`, `<item 1>`, ... , `<item n>`]

grocery_list: `list[str]` = ["bananas", "milk", "bread"]

Initializing an already populated list

<list name>: **list**[<item type>] = [<item 0>, <item 1>, ... , <item n>]

grocery_list: **list**[str] = ["bananas", "milk", "bread"]

Let's try it!

Create a list called
game_points that
stores the following
numbers: 102, 86,
94

Indexing

```
grocery_list: list[str] = ["bananas", "milk", "bread"]
```

```
grocery_list[0]
```

***Starts at 0, like with strings!*

Indexing

```
grocery_list: list[str] = ["bananas", "milk", "bread"]
```

```
grocery_list[0]
```

***Starts at 0, like with strings!*

Let's try it!

In `game_points`, use subscription notation to print out 94.

Modifying by index

```
grocery_list: list[str] = ["bananas", "milk", "bread"]
```

```
grocery_list[1] = "eggs"
```

Modifying by index

```
grocery_list: list[str] = ["bananas", "milk", "bread"]
```

```
grocery_list[1] = "eggs"
```

Let's try it!

In `game_points`, use subscription notation to change 86 to 72.

Modifying by index

```
grocery_list: list[str] = ["bananas", "milk", "bread"]
```

```
grocery_list[1] = "eggs"
```

Let's try it!

In `game_points`, use subscription notation to change 86 to 72.

Question: Could you do this type of modification with a string? Try it out!

Length of a list

```
grocery_list: list[str] = ["eggs", "milk", "bread"]
```

```
len(grocery_list)
```

Length of a list

```
grocery_list: list[str] = ["eggs", "milk", "bread"]
```

```
len(grocery_list)
```

Let's try it!

Print the length of
game_points.

Remove an item from a list – “pop off!”

```
grocery_list: list[str] = ["eggs", "milk", "bread"]
```

```
grocery_list.pop(2)
```



Index of item you want to remove

Remove an item from a list – “pop off!”

```
grocery_list: list[str] = ["eggs", "milk", "bread"]
```

```
grocery_list.pop(2)
```

Index of item you want to remove

Before: ["eggs", "milk", ~~"bread"~~]

Index: 0 1 2

After: ["eggs", "milk"]

Index: 0 1

Remove an item from a list – “pop off!”

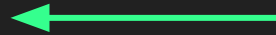
```
grocery_list: list[str] = ["eggs", "milk", "bread"]
```

```
grocery_list.pop(1)
```

Index of item you want to remove

Before: ["eggs", ~~"milk"~~, "bread"]

Index: 0 1 2



After: ["eggs", "bread"]


Index: 0 1

Remove an item from a list – “pop off!”

```
grocery_list: list[str] = ["eggs", "milk", "bread"]
```

```
grocery_list.pop(2)
```

Index of item you want to remove



Let's try it!

Remove 72 from
game_points.

Code-writing example

- Implement a function named `contains` with two parameters:
 - `needle: int` we are searching for
 - `haystack: list[int]` of values we are searching through
- Return `True` if the needle appears at least once in the haystack, and `False` otherwise